KING®

KY 92

VHF COMM

TRANSCEIVER

-5165-

MAINTENANCE/OVERHAUL MANUAL

Sections I, II, and III have been deleted from the Maintenance-Overhaul Manual format. The Installation Manual, which covers the same information, should be placed behind this tab to complete your technical library for each unit. It is recommended that the entire Installation Manual be removed and replaced when a revision is issued. The revision number and date of revision are printed on each Installation Manual cover page.

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MAINTENANCE/OVERHAUL MANUAL

KY 92

COMM TRANSCEIVER

MANUAL NO. 006-5165-00

REV. 0 JANUARY, 1978

KING RADIO CORPORATION®

400 NORTH ROGERS ROAD OLATHE, KANSAS, U.S.A.

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NAME	Transmitter PC Bd. Assy	ASS'Y. NO.	200-5997-00

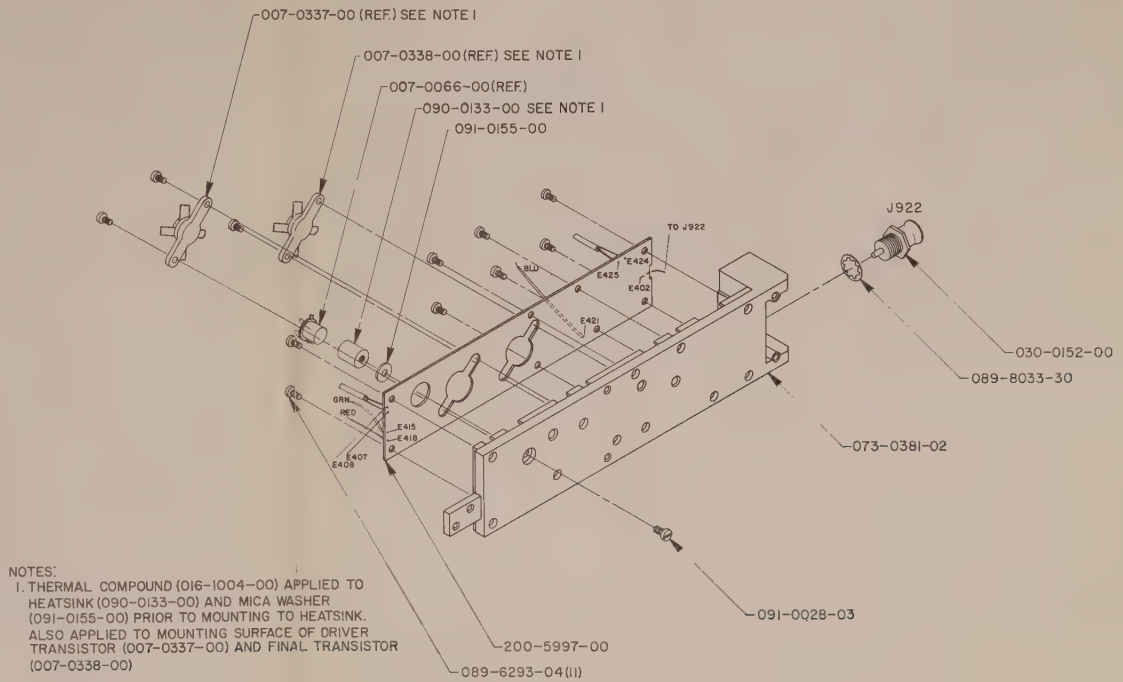
KING RADIO CORP PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C419	104-0001-01	Cap D/M 120pf		1				
C420	096-1006-00	Cap Tan 1uf 50V		-				
C421	113-5102-00	Cap D/C .001uf		-				
C422	113-5331-00	Cap D/C 330pf		-				
C423	113-3120-00	Cap D/C 12pf		-				
C424	106-0001-03	Cap Mld 1.5pf		1				
C425	113-3220-00	Cap D/C 22pf		2				
C426	106-0001-42	Cap Mld 9.1pf		1				
C427	113-3220-00	Cap D/C 22pf		-				
C428	106-0001-34	Cap Mld 6.8pf		1				
C429	113-3120-00	Cap D/C 12pf		-				
C430	111-0001-07	.022µf						
R401	130-0332-23	Res F/C QW 5% 3.3K		2				
R402	130-0332-23	Res F/C QW 5% 3.3K		-				
R403	130-0471-23	Res F/C QW 5% 470 Ohm		1				
R404	130-0180-23	Res F/C QW 5% 18 Ohm		1				
R405	130-0100-23	Res F/C QW 5% 10 Ohm		3				
R406	130-0180-33	Res F/C HW 5% 18 Ohm		1				
R407	130-0027-23	Res F/C QW 5% 2.7 Ohm		2				
R408	130-0100-23	Res F/C QW 5% 10 Ohm		-				
R409	130-0270-33	Res F/C HW 5% 27 Ohm		1				
R410	130-0027-23	Res F/C QW 5% 2.7 Ohm		-				
R411	130-0161-23	Res F/C QW 5% 160 Ohm		1				
R412	130-0100-23	Res F/C QW 5% 10 Ohm		-				

NAME	Transmitter PC Bd. Assy	ASS'Y. NO.	200-5997-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-5997-00	PC Bd Xmtr		1				
Q401	007-0195-00	Tstr Si MPSH10		1				
Q402	007-0066-00	Tstr Si 2N3866		1				
Q403	007-0337-00	Tstr Si		1				
Q404	007-0338-00	Tstr Si		1				
CR401	007-6025-00	Diode Si 1N4003		2				
CR402	007-6025-00	Diode Si 1N4003		-				
CR403	007-6099-00	Diode Si UM9401		1				
CR404	007-6070-00	Diode Si MPN3401		1				
L401	019-2273-00	Choke Bead 2T		3				
L402	019-2099-00	Choke Mld .047uh		2				
L403	019-2273-00	Choke Bead 2T		-				
L404	019-2099-00	Choke Mld .047uh		-				
L405	019-2273-00	Choke Bead 2T		-				
L406	019-2084-29	Choke Mld 2.2uh		1				
L407		Inductor Printed		REF				
L408		Inductor Printed		REF				
L409		Inductor Printed		REF				
T401	019-3026-02	Xfmr Toroid 2T Biflr		2				
T402	019-3026-02	Xfmr Toroid 2T Biflr		-				
T403	019-3045-00	Xfmr Toroid 5T Tap @ 2		1				
C401	113-5102-00	Cap D/C .001uf		4				
C402	113-5331-00	Cap D/C 330pf		4				
C403	104-0001-15	Cap DM 10pf		1				
C404	113-5331-00	Cap D/C 330pf		-				
C405	104-0001-29	Cap DM 36pf		2				
C406	104-0001-44	Cap DM 56pf		1				
C407	104-0001-29	Cap DM 36pf		-				
C408	113-5102-00	Cap D/C .001uf		-				
C409	096-1006-00	Cap Tan 1uf 50V		3				
C410	113-5331-00	Cap D/C 330pf		-				
C411	113-3200-00	Cap D/C 20pf		2				
C412	104-0001-35	Cap DM 68pf		1				
C413	104-0001-09	Cap DM 47pf		1				
C414	113-5102-00	Cap D/C .001uf		-				
C415	096-1006-00	Cap Tan 1uf 50V		-				
C416	100-0002-18	Cap Mica 400pf		1				
C417	113-3200-00	Cap D/C 20pf		-				
C418	113-3120-00	Cap D/C 12pf		3				



NOTES:
1. THERMAL COMPOUND (016-1004-00) APPLIED TO HEATSINK (090-0133-00) AND MICA WASHER (091-0155-00) PRIOR TO MOUNTING TO HEATSINK. ALSO APPLIED TO MOUNTING SURFACE OF DRIVER TRANSISTOR (007-0337-00) AND FINAL TRANSISTOR (007-0338-00)

FIGURE 5-5 KY 92 TRANSMITTER SUB-ASSEMBLY
(Dwg. No. 300-2308-00, R-0)

NAME	Final Assembly	ASS'Y. NO.	064-1020-00

KING RADIO CORP PARTS LISTING

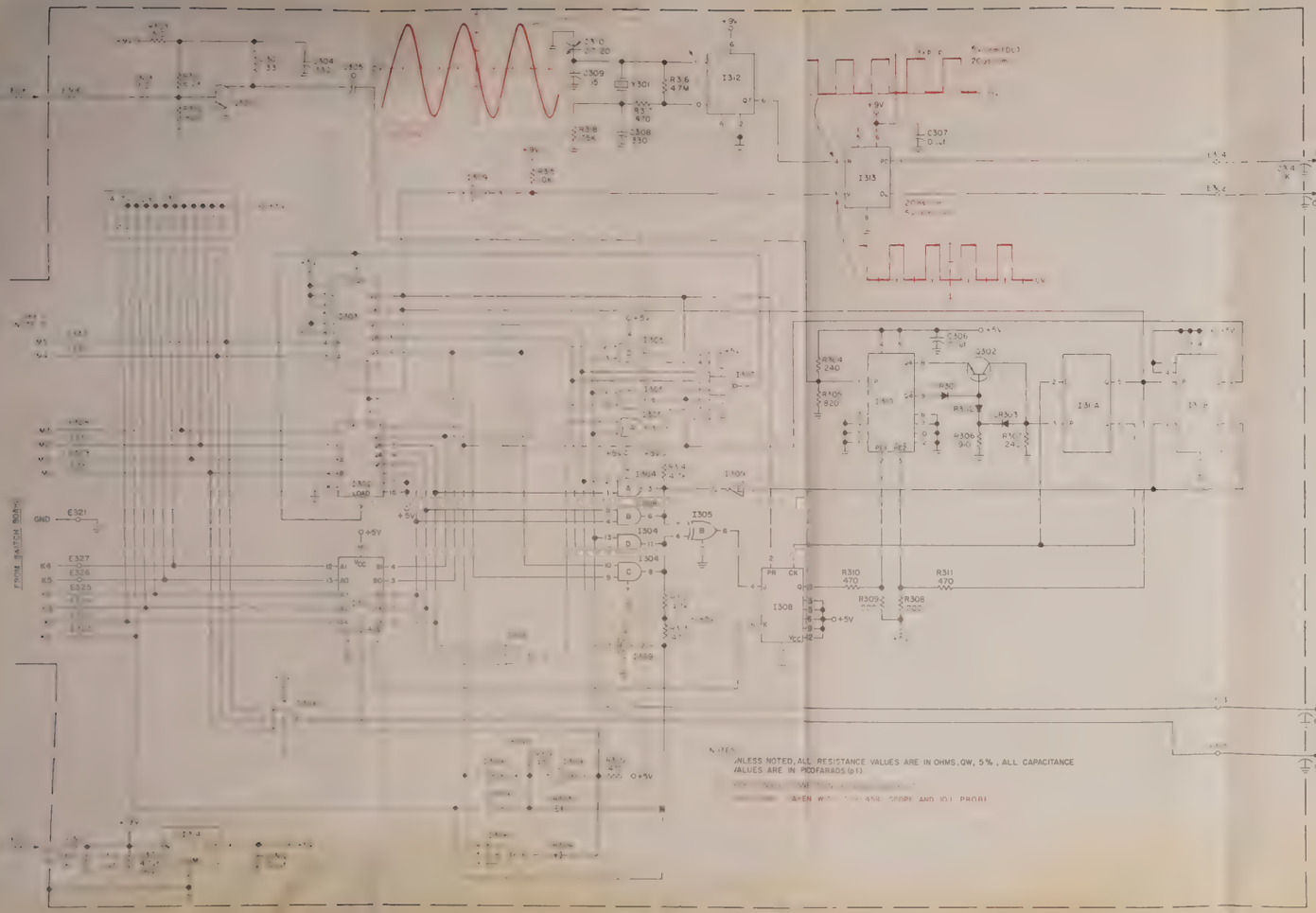
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	047-4571-01	Frame Unit		1				
	047-4572-01	Cover Top		1				
	047-4573-01	Cover Sub-Assy Bot		1				
	047-4575-02	Rack Assy Mounting		1				
	047-4578-01	Plate Upper Shld-VCO		1				
	057-2073-00	Decal		1				
	088-0812-01	Knob W/SHFT-Vol & Sq		1				
	089-2076-30	Nut Hex 4-40		8				
	089-5436-08	SCR 4-40x1/2 FHP 82°		3				
	089-5499-06	SCR 4-24x3/8 FHP 82°		8				
	089-6293-03	SCR 3-48x3/16 PHP-TT		14				
	089-6293-04	SCR 3-48x¼ PHP-TT		2				
	089-6298-03	SCR 3-48x3/16 FHP-TT		20				
	089-6310-04	SCR Tap #3x¼ Blk		4				
	091-0156-00	Washer, Shoulder		1				
	091-0286-02	Insulator Tstr		1				
	200-2308-00	Xmtr Sub Assy		1				
	200-2309-00	Digital Sub Assy		1				
	200-2310-00	Front Panel Sub Assy		1				
	200-5991-00	COMM Xcvr Sub Assy		1				
	089-8014-37	Washer INT Tooth #4		8				
	089-5222-05	Scr, 4-40x5/16 FHP 82°		5				
	073-0379-01	Hold-Down		1				
	089-8231-00	Washer		1				
	090-0265-00	Groove Pin		1				
	076-0921-00	Retaining Screw		1				
	047-4574-01	Bracket Hold-Down		1				
	076-0139-03	Stand-Off 4-40		1				
	076-0164-06	Stand-Off 4-40		2				
	047-4599-01	Cover Preselector		1				
	047-4600-01	Shield, Lead		1				
	047-4601-01	Shield, Lead		1				

NAME	ASS'Y. NO.
Final Assembly	064-1020-00

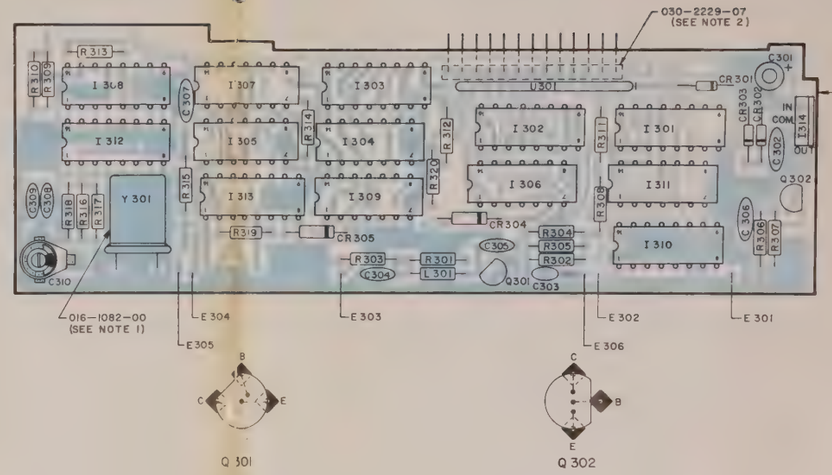
KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	016-1004-00	Thermo Compound		AR				
	025-0003-02	Wire, INS #22 Red		.5				
	025-0003-06	Wire INS #22 Blu		.5				
	025-0018-00	Wier INS #26 Blk		1				
	025-0018-20	Wire INS #26 Red		1				
	025-0018-30	Wire INS #26 Org		1				
	025-0018-40	Wire INS #26 Yel		1				
	025-0018-50	Wire INS #26 Grn		.5				
	026-0002-00	Wire Copper 24		2				
	150-0003-10	Tubing TFE #24		.3				
	012-1128-00	Insulator		1				
	012-1129-00	Insulator		1				
	016-1082-00	Adhesive RTV		AR				
	150-0049-10	Tubing 1/8" Dia.		.5				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Final Assembly				ASS'Y. NO. 064-1020-00
ASS'Y. DWG. 300-2311-00			UNIT KY 92	USED ON 000-0235-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
4				
				KY 92 Maintenance Manual Rev. 0, January, 1978



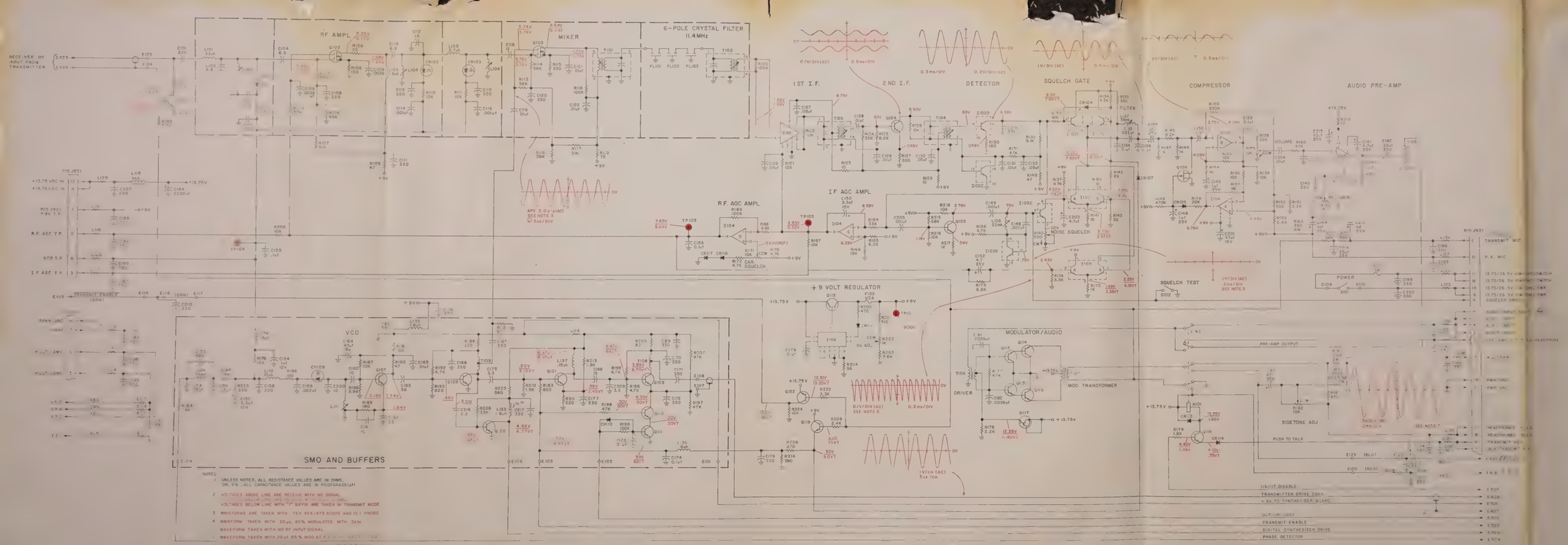
NOTES:
UNLESS NOTED, ALL RESISTANCE VALUES ARE IN OHMS, .QW, 5%, ALL CAPACITANCE VALUES ARE IN MICROFARADS (μf)
[illegible] WHEN WITH [illegible] SCOPE AND 10:1 PROBE



NOTES:

1. 016-1082-00 RTV APPLIED UNDER CRYSTAL.
2. 030-2229-07 RIGHT ANGLE HEADER IS ON FAR SIDE OF BOARD. SEE 200-2309-00.

FIGURE 5-4A DIGITAL SYNTHES[illegible] ASSEMBLY AND



NOTES:

1. UNLESS NOTED, ALL RESISTANCE VALUES ARE IN OHMS, OHM, 5% - ALL CAPACITANCE VALUES ARE IN PICOFARADS (pF)
2. VOLTAGES ABOVE LINE ARE RECEIVE WITH NO SIGNAL VOLTAGES BELOW LINE WITH "T" SUFFIX ARE TAKEN IN TRANSMIT MODE
3. WAVEFORMS ARE TAKEN WITH TEK 454/475 SCOPE AND 10:1 PROBE
4. WAVEFORM TAKEN WITH 20 µv, 85% MODULATED WITH 2kHz
5. WAVEFORM TAKEN WITH NO RF INPUT SIGNAL
6. WAVEFORM TAKEN WITH 20 µV 85% MOD AT [illegible]

FIGURE 5-2B KY 92 COMM TRANSCEIVER/RECEIVER BOARD SCHEMATIC
(Dwg. No. 002-0474-02, R-2)

NAME	ASS'Y. NO.
COMM Transceiver P/C Bd. Assy	200-5991-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
TP101	008-0096-01	Terminal Test Point		4				
TP102	008-0096-01	Terminal Test Point		-				
TP103	008-0096-01	Terminal Test Point		-				
TP104	008-0096-01	Terminal Test Point		-				
	009-5991-00	COMM XCVR PC Bd		1				
	026-0002-00	Wire Copper #24		1				
	026-0005-00	Wire Copper #18		.3				
	047-4576-01	Bracket Vol Contr		1				
	047-4577-01	Plate Shield Lower		1				
	047-2154-00	Can VCO		1				
	047-4598-01	Shield Preselector		1				
	076-1019-01	Collar Hex Vol Contr		1				
	088-0066-00	Spacer Crystal		3				
	088-0811-01	Coupler Sq SW		1				
	089-2106-11	Nut, Hex 1/4-32		1				
	089-6218-04	SCR Set 4-40x1/8		1				
	089-6218-06	SCR Set 4-40x3/16		2				
	089-8042-30	Washer, Int Locking 1/4		1				
	090-0296-00	Clip Fuse		4				
	091-0015-00	Grommet Rubber		1				
	091-0109-03	Tie Wrap 8"		1				
	150-0006-10	Tubing Teflon #18		.5				
	155-2083-00	Buss Bar		1				
	150-0003-10	Tubing Teflon #24		.1				
Q101	007-0254-00	Tstr PNP MPS A92		1				
Q102	007-0317-00	Tstr FET SD306		1				
Q103	007-0317-01	Tstr FET SD305		1				
Q104	007-0195-00	Tstr NPN MPS-H10		6				
Q105	007-0035-00	Tstr NPN 2N3415		5				
Q106	007-0280-01	Tstr FET E175		1				
Q107	007-0195-00	Tstr NPN MPS-H10		-				
Q108	007-0195-00	Tstr NPN MPS-H10		-				
Q109	007-0195-00	Tstr NPN MPS-H10		-				
Q110	007-0035-00	Tstr NPN 2N3415		-				
Q111	007-0035-00	Tstr NPN 2N3415		-				
Q112	007-0292-00	Tstr PNP 2N6109		1				
Q113	007-0153-00	Tstr PNP 2N4403		2				
Q114	007-0335-00	Tstr PNP TIP-42		2				
Q115	007-0153-00	Tstr PNP 2N4403		-				
Q116	007-0335-00	Tstr PNP TIP-42		-				
Q117	007-0333-00	Tstr NPN HS5305		1				
Q118	007-0035-00	Tstr NPN 2N3415		-				
Q119	007-0035-00	Tstr NPN 2N3415		-				
Q120	007-0195-00	Tstr NPN MPS-H10		-				
Q121	007-0195-00	Tstr NPN MPS-H10		-				
Q122	007-0238-00	Tstr PNP FPN4917		1				
CR101	007-4026-00	Diode VCTR MV209(4 Ea.)		1				
CR102	007-4026-00	Diode VCTR MV209		-				
CR103	007-4026-00	Diode VCTR MV209		-				
CR104	007-6016-00	Diode Si 1N4154		7				
CR105	007-6016-00	Diode Si 1N4154		-				
CR107	007-6016-00	Diode Si 1N4154		-				

NAME COMM Transceiver PC Bd. Assy | ASS'Y. NO. 200-5991-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
CR109	007-4026-00	Diode VCTR MV209		-				
CR110	007-6016-00	Diode Si 1N4154		-				
CR111	007-6016-00	Diode Si 1N4154		-				
CR113	007-6025-00	Diode Si 1N4003		1				
CR114	007-6016-00	Diode Si 1N4154		-				
CR116	007-6016-00	Diode Si 1N4154		-				
CR117	007-6106-00	Diode Si 1N4156		1				
FL101	017-0068-00	Filter Xtal 11.4MHz		1				
FL102	017-0068-00	Filter Xtal 11.4MHz		-				
FL103	017-0068-00	Filter Xtal 11.4MHz		-				
L101	019-2084-09	Ind Fixed .33uh 10%		1				
L102	019-3081-00	Coil RF		3				
L103	019-2084-27	Ind Fixed 1.8uh 10%		5				
L104	019-3081-00	Coil RF		-				
L105	019-2084-31	Ind Fixed 2.7uh 10%		1				
L106	019-3081-00	Coil RF		-				
L107	019-8071-00	Ind Var 55mh		2				
L108	019-2109-00	Ind Var 22mh		1				
L109	019-8071-00	Ind Var 55mh		-				
L110	019-2084-49	Ind Fixed 15uh 10%		1				
L111	019-3080-00	Coil VCO		1				
L112								
L113								
L114	013-0006-03	Ind Bead		18				
L115	019-2209-00	Choke Hash 600uh		1				
L116	013-0006-03	Ind Bead		-				
L117	013-0006-03	Ind Bead		-				
L118	013-0006-03	Ind Bead		-				
L119	013-0006-03	Ind Bead		-				
L120	013-0006-03	Ind Bead		-				
L121	013-0006-03	Ind Bead		-				
L122	013-0006-03	Ind Bead		-				
L123	013-0006-03	Ind Bead		-				
L124	013-0006-03	Ind Bead		-				
L125	013-0006-03	Ind Bead		-				
L126	013-0006-03	Ind Bead		-				
L127	013-0006-03	Ind Bead		-				
L128	013-0006-03	Ind Bead		-				
L129	013-0006-03	Ind Bead		-				
L130	013-0006-03	Ind Bead		-				
L131	013-0006-03	Ind Bead		-				
L132	013-0006-03	Ind Bead		-				
L133	019-2084-27	Ind Fixed 1.8uh		-				
L134	019-2084-27	Ind Fixed 1.8uh		-				
L135	019-2084-27	Ind Fixed 1.8uh		-				

NAME	ASS'Y. NO.
COMM Transceiver PC Bd. Assy	200-5991-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
S101		SW Power(Part of R159)		-				
S102	031-0351-00	SW SQ		1				
K101	032-0039-03	Relay 4PDT		1				
F101	036-0058-04	Fuse 5 Amp 32V		1				
F102	036-0060-04	Fuse 1/2 Amp 125V		1				
T101	019-8067-00	Xfmr IF Toko 10mm		2				
T102	019-8067-00	Xfmr IF Toko 10mm		-				
T103	019-8076-01	Xfmr IF TOKO 10mm		1				
T104	019-8070-00	Xfmr IF TOKO 10mm		1				
T105	019-5078-00	Xfmr Audio		1				
T106	019-5071-00	Xfmr Driver		1				
T107	019-5080-00	Xfmr Mod		1				
T108	019-3082-00	Xfmr RF 4T-Bflr		2				
T109	019-3082-00	Xfmr RF 4T-Bflr		-				
L136	019-2084-27	Ind Fixed 1.8uh		-				
L137	019-2084-01	Ind Fixed .15uh		1				

NAME COMM Transceiver PC Bd. Assy | ASS'Y. NO. 200-5991-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	COUF	QUANTITY -00	-01	-02	-03	-04
C101	113-5221-01	Cap D/C 220pf		7				
C102								
C103	113-3068-00	Cap D/C 6.8pf		3				
C104	113-3068-00	Cap D/C 6.8pf		-				
C105	113-5221-01	Cap D/C 220pf		-				
C106	111-0001-10	Cap D/C .0039uf		1				
C107	114-5102-00	Cap D/C .001uf		5				
C108	113-5221-01	Cap D/C 220pf		-				
C109	113-5331-00	Cap D/C 330pf		37				
C110	113-3068-00	Cap D/C 6.8pf		-				
C111	113-5331-00	Cap D/C 330pf		-				
C112	106-0001-14	Cap 1.8pf		1				
C113	113-5221-01	Cap D/C 220pf		-				
C114	114-5102-00	Cap D/C .001uf		-				
C115	113-5221-01	Cap D/C 220pf		-				
C116	114-5102-00	Cap D/C .001uf		-				
C117								
C118	113-3120-00	Cap D/C 12pf		1				
C119	109-0007-00	Cap D/C .01uf		9				
C120	113-5331-00	Cap D/C 330pf		-				
C121	109-0007-00	Cap D/C .01		-				
C122	109-0007-00	Cap D/C .01		-				
C123								
C124	114-7104-00	Cap D/C .1/12V		9				
C125	114-7104-00	Cap D/C .1/12V		-				
C126	109-0007-03	Cap D/C .05uf		7				
C127	109-0007-03	Cap D/C .05uf		-				
C128	109-0007-00	Cap D/C .01uf		-				
C129	109-0007-00	Cap D/C .01uf		-				
C130	109-0007-03	Cap D/C .05uf		-				
C131	109-0007-00	Cap D/C .01uf		-				
C132	109-0007-03	Cap D/C .05uf		-				
C133	114-7104-00	Cap D/C .1uf 12V		-				
C134	109-0007-03	Cap D/C .05uf		-				
C135	109-0007-01	Cap D/C .022		2				
C136	114-7104-00	Cap D/C .1uf 12V		-				
C137	097-0068-10	Cap AL 1uf 25V		5				
C138	114-7104-00	Cap D/C .1uf 12V		-				
C139	113-5331-00	Cap D/C 330pf		-				
C140	113-5221-01	Cap D/C 220pf		-				
C141	097-0068-11	Cap AL 4.7uf 25V		3				
C142	097-0068-21	Cap AL 33uf 25V		2				
C143	109-0007-05	Cap D/C .1uf 25V		1				
C144	097-0068-10	Cap AL 1uf 25V		1				
C145	097-0068-10	Cap AL 1uf 25V		1				
C146	097-0068-10	Cap AL 1uf 25V		1				
C147	109-0007-03							
C148	109-0007-01	Cap D/C .022uf		-				
C149	114-5102-00	Cap D/C .001uf		-				
C150	096-1082-12	Cap Tan 3.3uf 15V		1				
C151	113-5331-00	Cap D/C 330pf		-				
C152	097-0068-11	Cap AL 4.7uf 25V		1				
C153	114-7104-00	Cap D/C .1uf 12V		1				

NAME	COMM Transceiver PC Bd Assy	ASS'Y. NO.	200-5991-00

KMG RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	QUANTITY -00	-01	-02	-03	-04
C154	109-0007-03	Cap D/C .05uf	-				
C155	113-5821-00	Cap D/C 820pf	1				
C156	109-0007-03	Cap D.C .05uf	-				
C157	096-1018-00	Cap Tan 3.3uf 15V	1				
C158	113-5221-01	Cap D/C 220	-				
C159	111-0001-07	Cap MC .022	1				
C160	113-3100-00	Cap D/C 10pf	3				
C161	113-3100-00	Cap D/C 10pf	-				
C162	113-3220-00	Cap D/C 22pf	1				
C163	113-3560-00	Cap D/C 56pf	2				
C164	097-0068-03	Cap Elect 47uf 16V	2				
C165	109-0007-00	Cap D/C .01uf	-				
C166	113-5331-00	Cap D/C 330pf	-				
C167	113-5331-00	Cap D/C ~~330pf~~ 18pf	-				
C168	113-3150-00	Cap D/C 15pf	1				
C169	113-5331-00	Cap D/C 330pf	-				
C170	113-5331-00	Cap D/C 330pf	-				
C171	113-5331-00	Cap D/C 330pf	-				
C172	113-5331-00	Cap D/C 330pf	-				
C173	114-7104-00	Cap D/C .1uf/12V	-				
C174	114-7104-00	Cap D/C .1uf/12V	-				
C175	113-3033-00	Cap D/C 3.3pf	2				
C176	113-5331-00	Cap D/C 330pf	-				
C177	113-5331-00	Cap D/C 330pf	-				
C178	113-5331-00	Cap D/C 330pf	-				
C179	109-0007-00	Cap D/C .01uf	-				
C180	113-5331-00	Cap D/C 330pf	-				
C181	111-0001-10	Cap MC .0039uf	2				
C182	111-0001-10	Cap MC .0039uf	-				
C183	097-0068-19	Cap Elect 47uf 35V	1				
C184	097-0070-04	Cap Elect 2200uf 25V	1				
C185	113-5331-00	Cap D/C 330pf	-				
C186	113-5331-00	Cap D/C 330pf	-				
C187	113-5331-00	Cap D/C 330pf	-				
C188	113-5331-00	Cap D/C 330pf	-				
C189	113-5331-00	Cap D/C 330pf	-				
C190	113-5331-00	Cap D/C 330pf	-				
C191	113-5331-00	Cap D/C 330pf	-				
C192	113-5331-00	Cap D/C 330pf	-				
C193	113-5331-00	Cap D/C 330pf	-				
C194	113-5331-00	Cap D/C 330pf	-				
C195	113-5331-00	Cap D/C 330pf	-				
C196	113-5331-00	Cap D/C 330pf	-				
C197	113-5331-00	Cap D/C 330pf	-				
C198	113-5331-00	Cap D/C 330pf	-				
C199	113-5331-00	Cap D/C 330pf	-				
C200	113-3100-00	Cap D/C 10pf	-				
C201	097-0068-03	Cap AL 47uf 16V	-				
C202	113-5331-00	Cap D/C 330	-				
C203	097-0068-11	Cap AL 4.7uf	-				
C204	109-0007-00	Cap D/C .01uf	-				
C205	114-5102-00	Cap D/C .001uf	-				
C206	113-5331-00	Cap D/C 330pf	-				
C207	113-5331-00	Cap D/C 330pf	-				

NAME	COMM Transceiver PC Bd Assy	ASS'Y. NO.	200-5991-00

KMG RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C209	113-3033-00	Cap D/C 3.3pf		-				
C210	113-5331-00	Cap D/C 330pf		-				
C211	113-5331-00	Cap D/C 330pf		-				
C212	113-5331-00	Cap D/C 330pf		-				
C213	097-0068-10	Cap AL 1uf		-				
C214	097-0068-21	Cap AL 33uf 25V		-				
C215	097-0068-15	Cap AL 10uf 25V		1				
C216	113-5022-00	Cap D/C 2.2pf		1				
C217	113-5331-00	Cap D/C 330pf		-				
C218	113-3056-00	5.6pf						
I101	120-3020-00	IC MC1350		1				
I102	120-3029-00	IC CA3086		2				
I103	120-3029-00	IC CA3086		-				
I104	120-3052-00	IC LM324N		1				
I105	120-3080-00	IC LM380N		1				
I106	120-3023-00	IC LM723CN		1				
R101	130-0222-23	Res F/C 2.2K QW 5%		3				
R102	130-0332-23	Res F/C 3.3K QW 5%		4				
R103	130-0103-23	Res F/C 10K QW 5%		16				
R104	130-0333-23	Res F/C 33K QW 5%		5				
R105	130-0563-23	Res F/C 56K QW 5%		3				
R106	130-0151-23	Res F/C 150 QW 5%		1				
R107	130-0513-23	Res F/C 51K QW 5%		2				
R108	130-0433-23	Res F/C 43K QW 5%		1				
R109	130-0470-23	Res F/C 47 QW 5%		3				
R110	130-0103-23	Res F/C 10K QW 5%		-				
R111	130-0103-23	Res F/C 10K QW 5%		-				
R112	130-0510-23	Res F/C 51 QW 5%		1				
R113	130-0563-23	Res F/C 56K QW 5%		-				
R114	130-0563-23	Res F/C 56K QW 5%		-				
R115	130-0331-23	Res F/C 330 QW 5%		2				
R116	130-0393-23	Res F/C 39K QW 5%		1				
R117	130-0513-23	Res F/C 51K QW 5%		-				
R118	130-0104-23	Res F/C 100K QW 5%		4				
R119	130-0750-23	Res F/C 75 QW 5%		1				
R120	130-0104-23	Res F/C 100K QW 5%		-				
R121	130-0123-23	Res F/C 12K QW 5%		1				
R122	130-0103-23	Res F/C 10K QW 5%		-				
R123	130-0100-23	Res F/C 10 QW 5%		3				
R124	130-0333-23	Res F/C 33K QW 5%		-				
R125	130-0822-23	Res F/C 8.2K QW 5%		2				
R126	130-0220-23	Res F/C 22 Ohm QW 5%		1				
R127	130-0301-23	Res F/C 300 QW 5%		1				
R128	130-0104-23	Res F/C 10K QW 5%		-				
R129	130-0100-23	Res F/C 10 QW 5%		-				
R130	130-0181-23	Res F/C 180 QW 5%		2				
R131	130-0473-23	Res F/C 47K QW 5%		6				

NAME	COMM Transceiver PC Bd Assy	ASS'Y. NO.	200-5991-00

KING RADIO CORP. PARTS LISTING

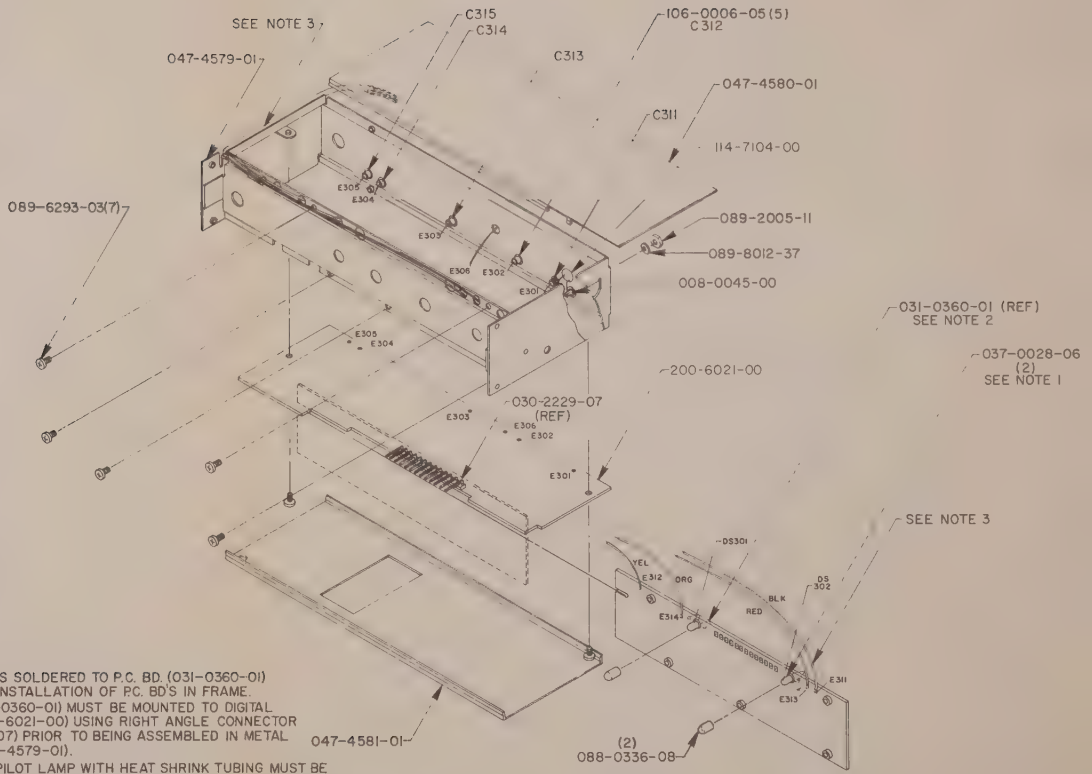
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R132	130-0912-23	Res F/C 9.1K QW 5%		1				
R133	130-0103-23	Res F/C 10K QW 5%		-				
R134	130-0432-23	Res F/C 4.3K QW 5%		1				
R135	130-0333-23	Res F/C 33K QW 5%		-				
R136	130-0472-23	Res F/C 4.7K QW 5%		7				
R137	130-0472-23	Res F/C 4.7K QW 5%		-				
R138	130-0103-23	Res F/C 10K QW 5%		-				
R139	130-0223-23	Res F/C 22K QW 5%		1				
R140	133-0072-07	Res Vari 500 Ohm		1				
R141	130-0102-23	Res F/C 1K QW 5%		6				
R142	130-0202-23	Res F/C 2K QW 5%		2				
R143	130-0202-23	Res F/C 2K QW 5%		-				
R144								
R145	130-0822-23	Res F/C 8.2K QW 5%		-				
R146	130-0102-23	Res F/C 1K QW 5%		-				
R147	130-0102-23	Res F/C 1K QW 5%		-				
R148	130-0474-23	Res F/C 470K QW 5%		1				
R149	130-0470-23	Res F/C 47 QW 5%		-				
R150	130-0224-23	Res F/C 220K QW 5%		1				
R151	130-0222-23	Res F/C 2.2K QW 5%		-				
R152	130-0201-23	Res F/C 200 QW 5%		1				
R153	130-0242-23	Res F/C 2.4K QW 5%		2				
R154	130-0102-23	Res F/C 1K QW 5%		-				
R155	130-0103-23	Res F/C 10K QW 5%		-				
R156	130-0103-23	Res F/C 10K QW 5%		-				
R157	130-0105-23	Res F/C 1M QW 5%		1				
R158	130-0203-23	Res F/C 20K QW 5%		1				
R159	133-0131-00	Res Vari 10K Vol		1				
R160	130-0473-23	Res F/C 47K QW 5%		-				
R161	130-0027-23	Res F/C 2.7 QW 5%		1				
R162	133-0072-09	Res Vari 1K		2				
R163	130-0391-33	Res F/C 390 HW 5%		2				
R164	130-0333-23	Res F/C 33K QW 5%		-				
R165	130-0622-23	Res F/C6.2K QW 5%		1				
R166	130-0153-23	Res F/C 15K QW 5%		1				
R167	130-0103-23	Res F/C 10K QW 5%		-				
R168	130-0682-23	Res F/C 6.8K QW 5%		2				
R169	130-0104-23	Res F/C 100K QW 5%		-				
R170	130-0472-23	Res F/C 4.7K QW 5%		-				
R171	133-0072-15	Res Vari 10K		2				
R172	130-0472-23	Res F/C 4.7K QW 5%		-				
R173	130-0682-23	Res F/C 6.8K QW 5%		-				
R174	130-0332-23	Res F/C 3.3K QW 5%		-				
R175	130-0102-23	Res F/C 1K QW 5%		-				
R176	130-0103-23	Res F/C 10K QW 5%		-				
R177	130-0473-23	Res F/C 47K QW 5%		-				
R178	130-0222-23	Res F/C 2.2K QW 5%		-				
R179	130-0182-23	Res F/C 1.8K QW 5%		4				
R180	132-5044-00	Res WW .68 2W		1				
R181	130-0471-23	Res F/C 470 QW 5%		2				
R182	133-0072-15	Res Vari 10K		-				
R183	130-0821-23	Res F/C 820 QW 5%		2				
R184	130-0182-23	Res F/C 1.8K QW 5%		-				
R185	130-0182-23	Res F/C 1.8K QW 5%		-				

NAME COMM Transceiver PC Bd Assy | ASS'Y. NO. 200-5991-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
R186	130-0101-23	Res F/C 100 QW 5%		2				
R187	130-0103-23	Res F/C 10K QW 5%		-				
R188	130-0392-23	Res F/C 3.9K QW 5%		1				
R189	130-0181-23	Res F/C 180 QW 5%		-				
R190	130-0470-23	Res F/C 47 QW 5%		-				
R191	130-0101-23	Res F/C 100 QW 5%		-				
R192	130-0472-23	Res F/C 4.7K QW 5%		-				
R193	130-0821-23	Res F/C 820 QW 5%		-				
R194	130-0221-23	Res F/C 220 QW 5%		3				
R195	130-0472-23	Res F/C 4.7K QW 5%		-				
R196	130-0472-23	Res F/C 4.7K QW 5%		-				
R197	130-0473-23	Res F/C 47K QW 5%		-				
R198	130-0473-23	Res F/C 47K QW 5%		-				
R199	130-0104-23	Res F/C 100K QW 5%		-				
R200	130-0471-23	Res F/C 470 QW 5%		-				
R201	130-0511-23	Res F/C 510 QW 5%		1				
R202	133-0072-09	Res Vari 1K		-				
R203	130-0362-23	Res F/C 3.6K QW 5%		1				
R204	130-0560-23	Res F/C 56 QW 5%		1				
R205	130-0820-23	Res F/C 82 QW 5%		1				
R206	130-0103-23	Res F/C 10K QW 5%		-				
R207	130-0473-23	Res F/C 47K QW 5%		-				
R208	130-0271-23	Res F/C 270 QW 5%		1				
R209	130-0242-23	Res F/C 2.4K QW 5%		-				
R210	130-0152-23	REs F/C 1.5K QW 5%		1				
R211	130-0221-23	REs F/C 220 QW 5%		-				
R212								
R213	130-0182-23	Res F/C 1.8K QW 5%		-				
R214	130-0391-23	Res F/C 390 QW 5%		1				
R215	130-0683-23	Res F/C 68K QW 5%		1				
R216	130-0103-23	Res F/C 10K QW 5%		-				
R217	130-0102-23	Res F/C 1K QW 5%		-				
R218	130-0103-23	Res F/C 10K QW 5%		-				
R219	130-0100-23	Res F/C 10 Ohm QW 5%		-				
R220	130-0221-23	Res F/C 220 QW 5%		-				
R221	130-0391-33	Res F/C 390 Ohm HW 5%		-				
R222	130-0332-23	Res F/C 3.3K QW 5%		-				
R223	130-0331-23	Res F/C 330 QW 5%		-				
R224	130-0103-23	Res F/C 10K QW 5%		-				
R225	130-0561-23	Res F/C 560 QW 5%		1				
R226	130-0333-23	Res F/C 33K QW 5%		-				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME COMM Tranaceiver PC Bd Assy.				ASS'Y. NO. 200-5991-00
ASS'Y. DWG.			UNIT	USED ON
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
4				
5				
6				
				KY 92 Maintenance Manual Rev. 0, January, 1978



NOTES:
1. PILOT LAMPS SOLDERED TO P.C. BD. (031-0360-01) FOLLOWING INSTALLATION OF P.C. BD'S IN FRAME.
2. SWITCH (031-0360-01) MUST BE MOUNTED TO DIGITAL P.C. BD. (200-6021-00) USING RIGHT ANGLE CONNECTOR (030-2229-07) PRIOR TO BEING ASSEMBLED IN METAL FRAME (047-4579-01).
3. WIRES FOR PILOT LAMP WITH HEAT SHRINK TUBING MUST BE SOLDERED TO SWITCHBOARD PRIOR TO INSTALLING COVER (047-4580-01).

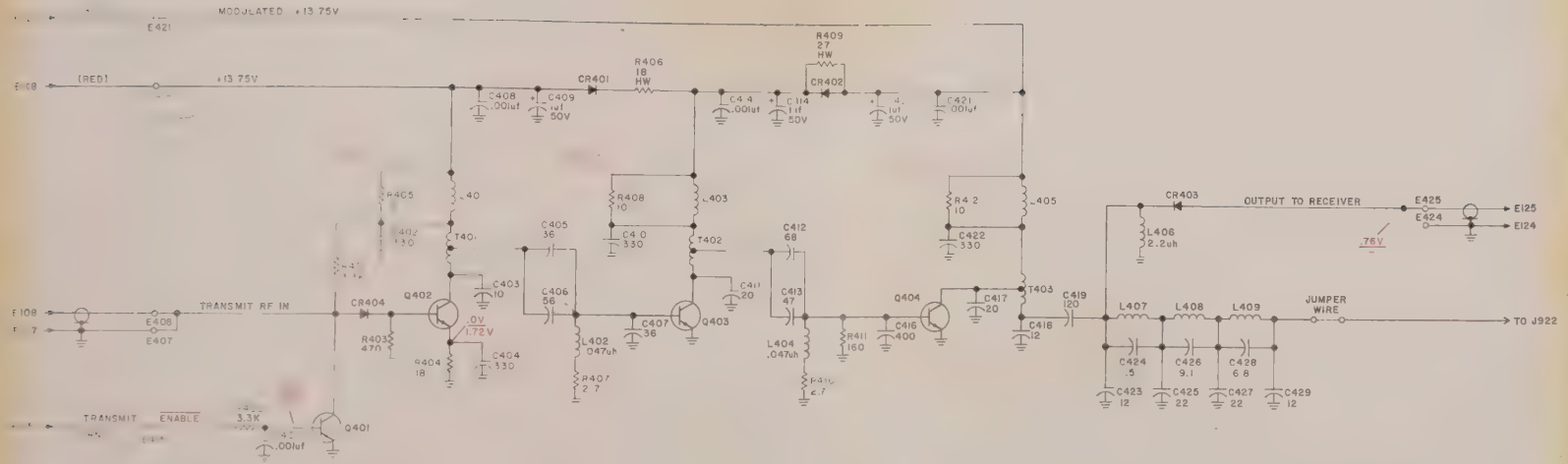
FIGURE 5-3 KY 92 DIGITAL SUB-ASSEMBLY
(Dwg. No. 300-2309-00, R-0)

NAME	ASS'Y. NO.
Digital Sub-Assy	200-2309-00

KING RADIO CORP. PARTS LISTING

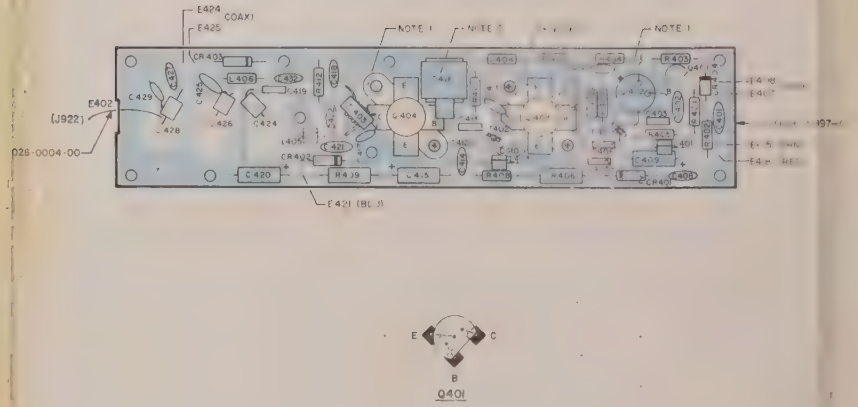
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
DS301	037-0028-06	Lamp 14V - .08A		2				
DS302	037-0028-06	Lamp 14V - .08A		-				
	047-4579-01	Frame Assy		1				
	047-4580-01	Cover Top		1				
	047-4581-01	Cover Bot		1				
	088-0336-08	Filter Lamp Blu		2				
	089-6293-03	SCR 3-48x3/16 PHP-TT		7				
C311-C315	106-0006-05	Cap FT 1000pf		5				
	200-6021-00	PC Bd Assy Digital		1				
C316	114-7104-00	Cap D/C .1uf		1				
	089-2005-11	Nut, 2-56		1				
	089-8012-37	Washer, Int. Tooth		1				
E307	008-0045-00	Terminal		1				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL
NAME Digital Sub-Assy				ASS'Y. NO. 200-2309-00
ASS'Y. DWG. 300-2309-00		UNIT KY 92		USED ON 064-1020-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
4				
				KY 92 Maintenance Manual Rev. 0, January, 1978



NOTES:

1. UNLESS NOTED, ALL RESISTANCE VALUES ARE IN OHMS, 0W, 5%; ALL CAPACITANCE VALUES ARE IN PICOFARADS (pf).
2. VOLTAGES TAKEN WITH FLUKE MODEL 8000A
   VOLTAGES ABOVE LINE REC MODE
   VOLTAGES BELOW LINE TX MODE

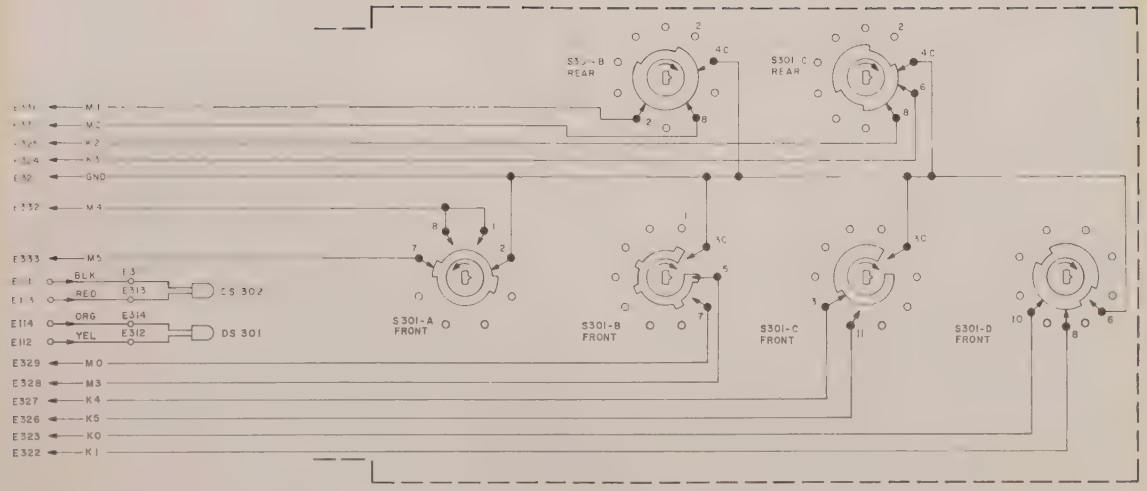


NOTES

1 TRANSISTORS Q402, Q403, AND Q404 MUST BE MOUNTED TO HEAT SINK PER 300-2308-00 BEFORE SOLDERING.

2 C416 SHOULD BE SOLDERED IN PLACE ONLY AFTER Q404 IS SOLDERED.

FIGURE 5-6 KY 92 TRANSMITTER BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 300-5997-00, R-0)
(Dwg. No. 002-0474-03, R-3)



NOTES

1 SWITCH SHOWN IN 130.000 MHZ POSITION
2 SWITCH ASSEMBLY 031-0360-01
3 SWITCH Bd 009-5992-00
4 RIGHT ANGLE CONNECTION 030-2229-07

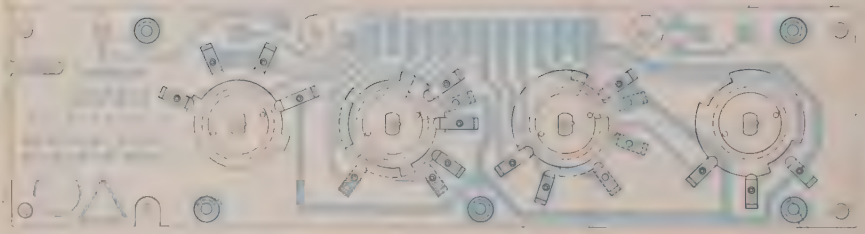


FIGURE 5-4B KY 92 SWITCH BOARD ASSEMBLY AND SCHEMATIC
(Dwg. No. 031-0360-00/01, R-2)
(Dwg. No. 002-0474-04, R-3)

NAME Digital PC Bd Assy | ASS'Y. NO. 200-6021-00

KING RADIO CORP. PARTS LISTING

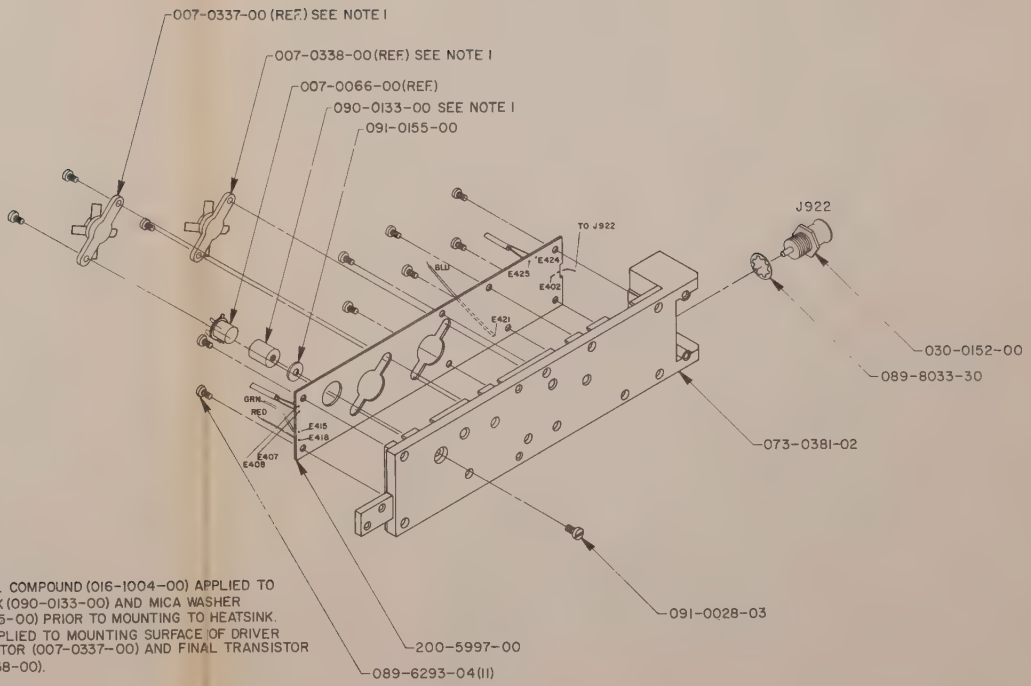
SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	030-2229-07	Header Rt Angle 13 Pin		1				
	031-0360-01	Switch Freq.		1				
	009-6021-00	Digital PC Bd		1				
Q301	007-0195-00	Tstr NPN MPS-H10		1				
Q302	007-0060-00	Tstr PNP MPS3640		1				
CR301	007-6016-00	Diode Si 1N4154		3				
CR302	007-6016-00	Diode Si 1N4154		-				
CR303	007-6016-00	Diode Si 1N4154		-				
CR304	007-6023-00	Diode GE 1N277		2				
CR305	007-6023-00	Diode GE 1N277		-				
RM301	015-0023-02	Res Mod 12-4.7K		1				
	016-1082-00	Adhesive RTV		AR				
L301	019-2084-09	Ind Fixed .33uh		1				
Y301	044-0053-03	Xtal 3.2MHz .003%		1				
				-				
C301	097-0068-03	Cap AL 47uf		1				
C302	114-7104-00	Cap D/C .1uf		3				
C303	113-5022-00	Cap D/C 2.2pf		1				
C304	113-5331-00	Cap D/C 330pf		2				
C305	113-3100-02	Cap D/C 10pf		1				
C306	114-7104-00	Cap D/C .1uf		-				
C307	114-7104-00	Cap D/C .1uf		-				
C308	113-5331-00	Cap D/C 330pf		-				
C309	113-3150-00	Cap D/C 15pf		1				
C310	102-0029-00	Cap Vari 2.7-20pf		1				
I301	120-0122-00	IC 93L24PC		1				
I302	120-0087-00	IC 74LS162		1				
I303	120-0088-00	IC 74LS163		1				
I304	120-0081-00	IC 74LS09		1				
I305	120-0086-00	IC 74LS86		1				
I306	120-0082-00	IC 74LS10		1				
I307	120-0084-00	IC 74LS30		1				
I308	120-0085-00	IC 74LS76		1				
I309	120-0054-02	IC 7416		1				
I310	120-4006-01	IC SP8640B		1				
I311	120-0072-00	IC 74LS74		1				
I312	120-6055-01	IC SCL4060		1				
I313	120-6038-01	IC SCL4046		1				

NAME	Digital PC Bd Assy	ASS'Y. NO.	200-6021-00

RCA RADIO CORP PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
I314	120-3026-00	IC MGH7805C Reg		1				
R301	130-0622-23	Res F/C 6.2K QW 5%		1				
R302	130-0821-23	Res F/C 820 QW 5%		2				
R303	130-0511-23	Res F/C 510 QW 5%		1				
R304	130-0241-23	Res F/C 240 QW 5%		2				
R305	130-0821-23	Res F/C 820 QW 5%		-				
R306	130-0911-23	Res F/C 910 QW 5%		1				
R307	130-0241-23	Res F/C 240 QW 5%		-				
R308	130-0221-23	Res F/C 220 QW 5%		2				
R309	130-0221-23	Res F/C 220 QW 5%		-				
R310	130-0471-23	Res F/C 470 QW 5%		6				
R311	130-0471-23	Res F/C 470 QW 5%		-				
R312	130-0472-23	Res F/C 4.7K QW 5%		2				
R313	130-0471-23	Res F/C 470 QW 5%		-				
R314	130-0472-23	Res F/C 4.7K QW 5%		-				
R315	130-0103-23	Res F/C 10K QW 5%		1				
R316	130-0475-23	Res F/C 4.7M QW 5%		1				
R317	130-0471-23	Res F/C 470 QW 5%		-				
R318	130-0753-23	Res F/C 75K QW 5%		1				
R319	130-0471-23	Res F/C 470 Ohm QW 5%		-				
R320	130-0471-23	Res F/C 470 Ohm QW 5%		-				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL KU
NAME Digital PC Bd Assy				ASS'Y. NO. 200-6021-00
ASS'Y. DWG. 300-6021-00		UNIT KY 92		USED ON 200-2309-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
				KY 92 Maintenance Manual Rev. 0, January, 1978



NOTES:
1. THERMAL COMPOUND (016-1004-00) APPLIED TO HEATSINK (090-0133-00) AND MICA WASHER (091-0155-00) PRIOR TO MOUNTING TO HEATSINK. ALSO APPLIED TO MOUNTING SURFACE OF DRIVER TRANSISTOR (007-0337-00) AND FINAL TRANSISTOR (007-0338-00).

FIGURE 5-5 KY 92 TRANSMITTER SUB-ASSEMBLY
(Dwg. No. 300-2308-00, R-0)

NAME	Transmitter Sub Assembly	ASS'Y. NO.	200-2308-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	030-0152-00	Conn BNC Hex		1				
	073-0381-02	Heatsink Xmtr		1				
	089-6293-04	SCR 3-48x⅛ PHP-TT		11				
	089-8033-30	Washer INT Tooth 3/8"		1				
	090-0133-00	Heatsink TO5 Tstr		1				
	091-0028-03	SCR 4-40x1/4 Nylon		1				
	091-0155-00	Mica Washer		1				
	200-5997-00	Xmtr PC Bd Assembly		1				
	025-0003-02	Wire INS #22 Red		.5				
	025-0003-06	Wire INS #22 Blu		.5				
	025-0018-50	Wire INS #26 Grn		.5				
	026-0013-00	Coax Cable RG-178		.75				
	026-0004-00	Wire Copper #20		.25				
	016-1004-00	Thermo Compound		AR				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL KU
NAME Transmitter Sub Assembly				ASS'Y. NO. 200-2308-00
ASS'Y. DWG. 300-2308--00		UNIT KY 92		USED ON 064-1020-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				KY 92 Maintenance Manual Rev. 0, January, 1978

NAME	Transmitter PC Bd. Assy	ASS'Y. NO.	200-5997-00

KING RADIO CORP. PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
	009-5997-00	PC Bd Xmtr		1				
Q401	007-0195-00	Tstr Si MPSH10		1				
Q402	007-0066-00	Tstr Si 2N3866		1				
Q403	007-0337-00	Tstr Si		1				
Q404	007-0338-00	Tstr Si		1				
CR401	007-6025-00	Diode Si 1N4003		2				
CR402	007-6025-00	Diode Si 1N4003		-				
CR403	007-6099-00	Diode Si UM9401		1				
CR404	007-6070-00	Diode Si MPN3401		1				
L401	019-2273-00	Choke Bead 2T		3				
L402	019-2099-00	Choke Mld .047uh		2				
L403	019-2273-00	Choke Bead 2T		-				
L404	019-2099-00	Choke Mld .047uh		-				
L405	019-2273-00	Choke Bead 2T		-				
L406	019-2084-29	Choke Mld 2.2uh		1				
L407		Inductor Printed		REF				
L408		Inductor Printed		REF				
L409		Inductor Printed		REF				
T401	019-3026-02	Xfmr Toroid 2T Biflr		2				
T402	019-3026-02	Xfmr Toroid 2T Biflr		-				
T403	019-3045-00	Xfmr Toroid 5T Tap @ 2		1				
C401	113-5102-00	Cap D/C .001uf		4				
C402	113-5331-00	Cap D/C 330pf		4				
C403	104-0001-15	Cap DM 10pf		1				
C404	113-5331-00	Cap D/C 330pf		-				
C405	104-0001-29	Cap DM 36pf		2				
C406	104-0001-44	Cap DM 56pf		1				
C407	104-0001-29	Cap DM 36pf		-				
C408	113-5102-00	Cap D/C .001uf		-				
C409	096-1006-00	Cap Tan 1uf 50V		3				
C410	113-5331-00	Cap D/C 330pf		-				
C411	113-3200-00	Cap D/C 20pf		2				
C412	104-0001-35	Cap DM 68pf		1				
C413	104-0001-09	Cap DM 47pf		1				
C414	113-5102-00	Cap D/C .001uf		-				
C415	096-1006-00	Cap Tan 1uf 50V		-				
C416	100-0002-18	Cap Mica 400pf		1				
C417	113-3200-00	Cap D/C 20pf		-				
C418	113-3120-00	Cap D/C 12pf		3				

NAME Transmitter PC Bd. Assy | ASS'Y. NO. 200-5997-00

KING RADIO CORP PARTS LISTING

SYMBOL	PART NUMBER	DESCRIPTION	CODE	QUANTITY -00	-01	-02	-03	-04
C419	104-0001-01	Cap D/M 120pf		1				
C420	096-1006-00	Cap Tan 1uf 50V		-				
C421	113-5102-00	Cap D/C .001uf		-				
C422	113-5331-00	Cap D/C 330pf		-				
C423	113-3120-00	Cap D/C 12pf		-				
C424	106-0001-03	Cap Mld 1.5pf		1				
C425	113-3220-00	Cap D/C 22pf		2				
C426	106-0001-42	Cap Mld 9.1pf		1				
C427	113-3220-00	Cap D/C 22pf		-				
C428	106-0001-34	Cap Mld 6.8pf		1				
C429	113-3120-00	Cap D/C 12pf		-				
C430	111-0001-07	Cap .022uf						
R401	130-0332-23	Res F/C QW 5% 3.3K		2				
R402	130-0332-23	Res F/C QW 5% 3.3K		-				
R403	130-0471-23	Res F/C QW 5% 470 Ohm		1				
R404	130-0180-23	Res F/C QW 5% 18 Ohm		1				
R405	130-0100-23	Res F/C QW 5% 10 Ohm		3				
R406	130-0180-33	Res F/C HW 5% 18 Ohm		1				
R407	130-0027-23	Res F/C QW 5% 2.7 Ohm		2				
R408	130-0100-23	Res F/C QW 5% 10 Ohm		-				
R409	130-0270-33	Res F/C HW 5% 27 Ohm		1				
R410	130-0027-23	Res F/C QW 5% 2.7 Ohm		-				
R411	130-0161-23	Res F/C QW 5% 160 Ohm		1				
R412	130-0100-23	Res F/C QW 5% 10 Ohm		-				

PARTS LIST REVISION HISTORY				ENGR. APPROVAL RA
NAME Transmitter PC Bd. Assy				ASS'Y. NO. 200-5997-00
ASS'Y. DWG. 300-5997-00			UNIT KY 92	USED ON 200-2308-00
REV	CHANGE	SYMBOL	PART NUMBER	DESCRIPTION
1				
2				
3				
				KY 92 Maintenance Manual Rev. 0, December, 1977

inter-city
MFG. CO., INC.
ST. LOUIS, MO. 63111

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SECTION VI
MAINTENANCE

6.1 GENERAL INFORMATION

Before maintenance of the KY 92 is attempted, a thorough understanding of the theory of operation (Section IV) as well as the information on transistor and integrated circuit maintenance is needed. This material is contained in Appendix A. Detailed information on the various integrated circuit packages used in the KY 92 is also found in this reference.

6.2 TEST AND ALIGNMENT

The following procedure is for aligning a KY 92 so it will meet the minimum performance specifications. If partial alignment is desired, use only the initial control setting that apply to the section being aligned.

6.2.1 GENERAL INFORMATION

A. "Hard" microvolts indicates use of a 6dB pad between the signal generator and the receiver.

B. A standard modulator test signal is a .4VRMS, 1KHz tone, open circuit, with the network shown in Figure 6-2.

6.2.2 TEST EQUIPMENT

The following test equipment, or equivalent, is required to properly align and test the KY 92. All test equipment must be calibrated before attempting alignment.

A. Power Supply: Heath IP2721 (13.75V @ 5AMP)

B. RF Signal Generator: Boonton Model 211A

C. Audio Signal Generator: HP 200CD

D. Digital Multimeter: Fluke 8000A

E. RF Wattmeter: Bird Model 611

F. Frequency Counter: HP 5382A

G. Audio Wattmeter with Load: Eico Model 261

H. Oscilloscope: Tektronix Model 454

I. RF Signal Generator: HP 606A

J. Linear Detector: Figure 6-4

K. Test Harness: Figure 6-5

L. 40dB Attenuator: Figure 6-3

6.2.3 ALIGNMENT PROCEDURE

This alignment procedure is written for a transceiver that has been recently overhauled. If partial alignment is desired, use only the initial control settings that apply to the section being aligned. The receiver squelch adjustments must be done in the correct sequence.

6.2.3.1 Initial Control Settings (Ref Figure 6-1)

R140	Noise Squelch	Max CW
R162	MIC Gain	Mid Range
R171	Carrier Squelch	Max CCW
R182	Sidetone	Mid Range
R202	9 Volt Adjust	Mid Range
R159	Volume Control	Max CCW (OFF)
S102	Squelch Test Frequency Selector	Pull Out 126.50MHz

6.2.3.2 Voltage Regulator Test (R202)

Connect unit to RF load. Apply power and advance volume to turn unit on. Read voltage at TP1 and adjust R202 for 9.00 volts.

6.2.3.3 VCO Adjust (L111)

Read voltage at TP4 and adjust L111 for 6.35 volts.

6.2.3.4 Frequency Adjust (C315) (Ref Figure 6-3)

Key transmitter and read output frequency on counter. Adjust C310 to 126.5000MHz.

6.2.3.5 Modulator Adjust (R162) (Ref Figures 6-2 and 6-4)

Apply a standard modulator test signal and key transmitter. Observe the output from the linear detector on an oscilloscope and adjust R162 (MIC Gain) for 85% modulation.

6.2.3.6 Sidetone Adjust (R182)

With transmitter keyed and modulated 85% with a standard modulator input signal, adjust R182 (sidetone) for 1.0 volt across a 500 ohm load at the headphone output.

6.2.3.7 RF-IF Alignment

NOTE

Be sure transmitter is not keyed!

Connect RF signal generator to the KY 92 through a 6dB pad. Turn unit on with squelch test pulled out and apply sufficient RF signal to obtain approximately 4.6V at TP2. Adjust L102, L104, L106, T101, T102, T103, and T104 for maximum voltage at TP2. Reduce RF input level to maintain the voltage at TP2 near 4.6 volts.

6.2.3.8 Noise Squelch Adjust (L108) (R140)

a. Push squelch test knob in and observe signal at pin 6 of I103 with oscilloscope. Set the RF signal generator for 25uv hard with 85% modulation at 8KHz. Adjust L108 for maximum p-p voltage as observed on the oscilloscope (approx. .3V p-p).

b. Apply 2.0uv hard modulated 30% with a 1KHz tone and turn R140 (noise squelch) clockwise till the speaker noise just quiets.

6.2.3.9 Carrier Squelch Adjust (R171)

Apply 25uv hard, modulated 85% with 8KHz and adjust R171 until speaker noise just quiets. This signal may be observed on an oscilloscope at pin 10 of I103.

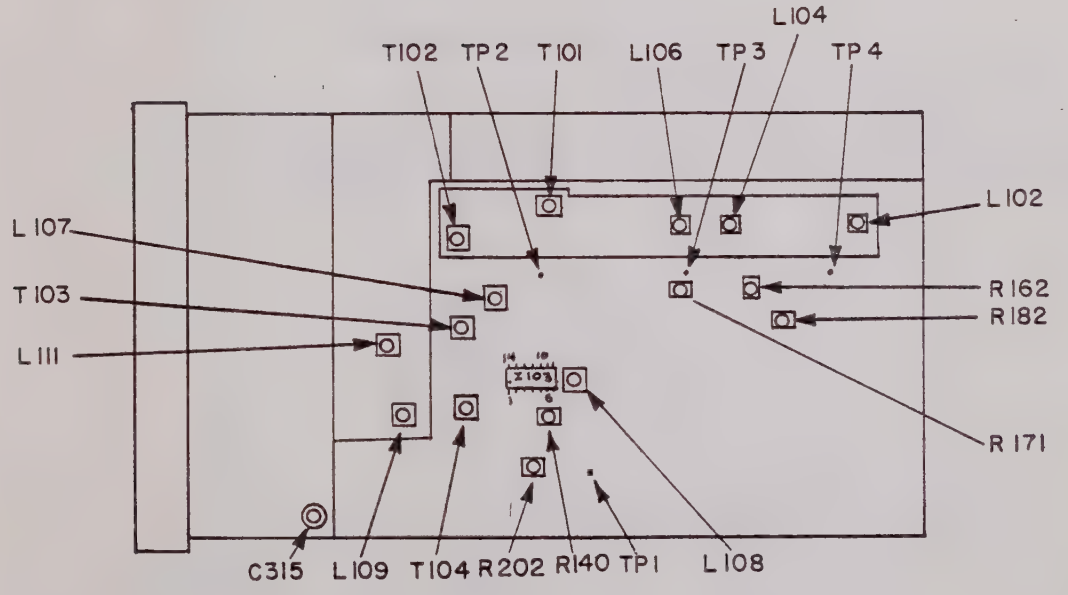


FIGURE 6-1 LOCATION OF ADJUSTMENTS AND TEST POINTS

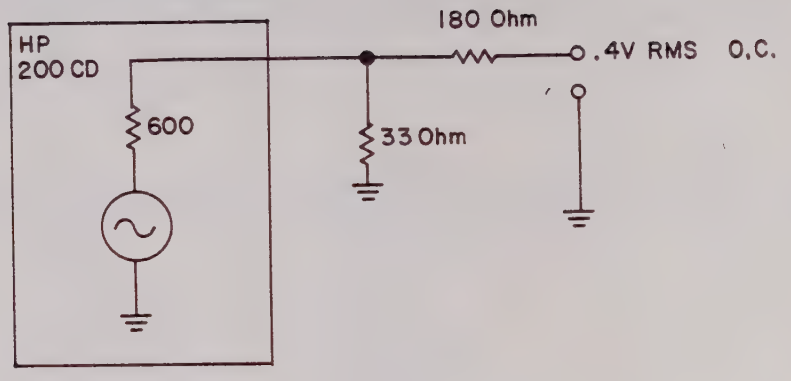


FIGURE 6-2 MICROPHONE AUDIO TEST

6.2.3.10 Climax Filter Adjust (L107)

Apply 100uv of RF modulated 30% with 5.5KHz and read the speaker output voltage. Set volume to a convenient level and adjust L107 for minimum speaker output voltage (null).

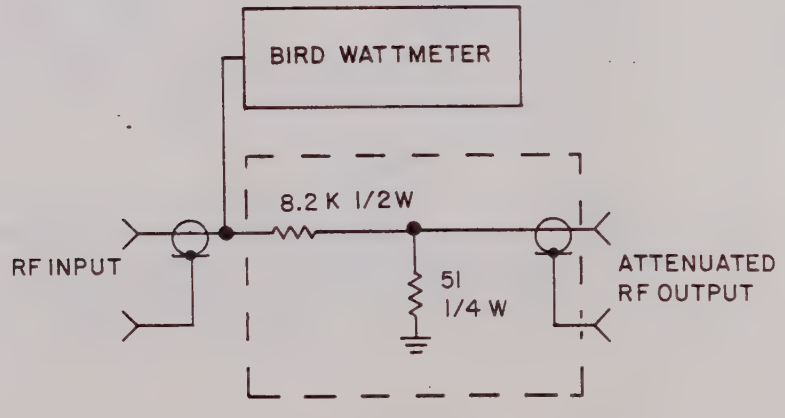
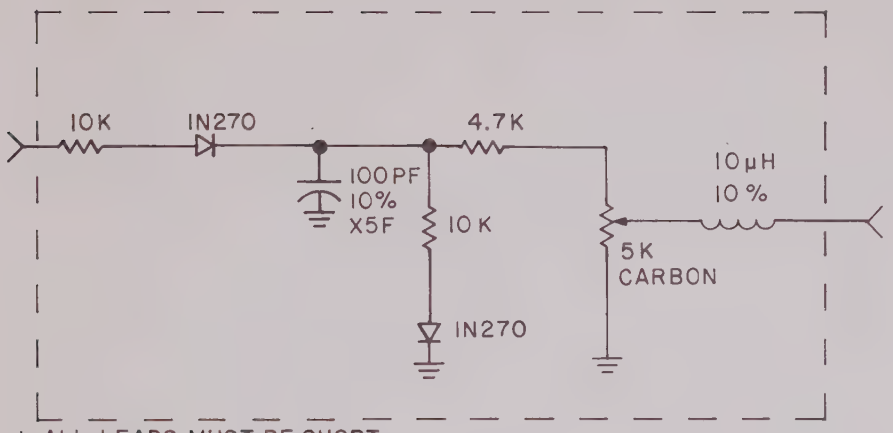
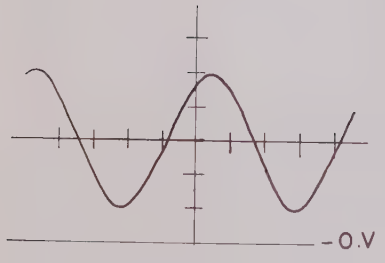


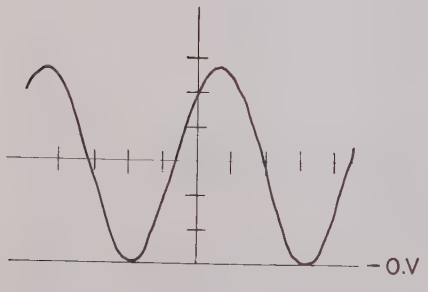
FIGURE 6-3 40dB ATTENUATOR SCHEMATIC DIAGRAM



1. ALL LEADS MUST BE SHORT.
2. HOUSE IN SMALL METAL BOX.
3. ALL RESISTORS ARE 1/4 W, 5% CARBON.



TP NO: Linear Detector
SCOPE USED: 465 XMIT Under-Modulated
20mv/cm, .2ms/cm
TRIG: INT, POS
TYPE PROBE: 1:1 From Linear Detector
COUPLING: DC



TP NO. Linear Detector
SCOPE USED: 465 XMIT Modulated Correctly
TRIG: INT, POS
TYPE PROBE: 1:1 From Linear Detector
COUPLING: DC

A. All leads must be short.
B. House in small metal box.
C. All resistors are 1/4 watt, 5% carbon.

FIGURE 6-4 LINEAR DETECTOR

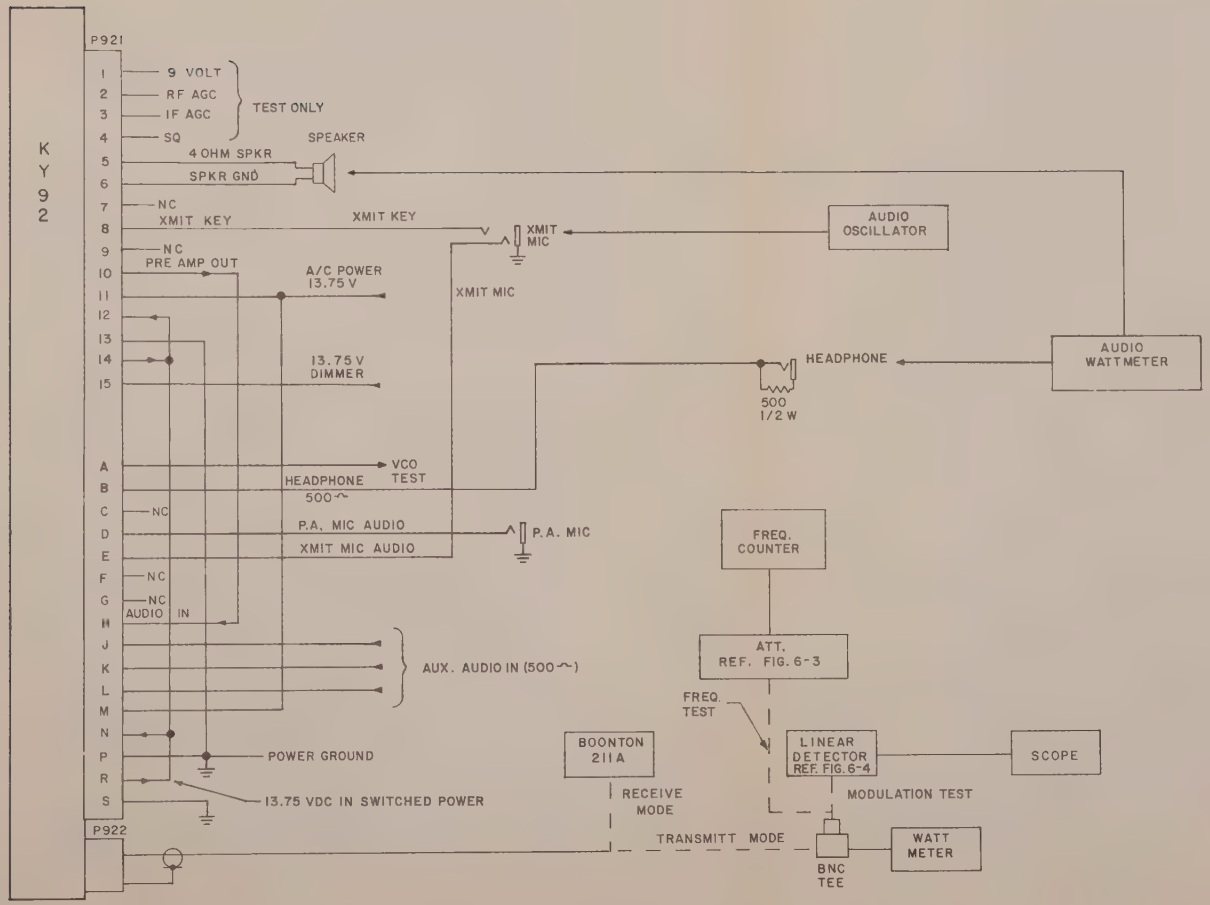


FIGURE 6-5 KY 92 BENCH TEST
(Dwg. No. 696-2955-00, R-0)

6.2.3.11 KY 92 Final Test Data

a. Preliminary Visual Inspection:

(1) Hardware:_____(OK) (2) Paper work_____(OK)

Input Voltage:_____VDC

(2) Receiver Sensitivity:

(a) s+n/n: 118.00MHz_____dB 135.97MHz_____dB
126.50MHz_____dB

(b) Quieting:_____dB (frequency = 126.5)

(3) AGC Characteristics:_____dB (frequency = 126.5)

(4) Selectivity:

(a) 6dB Bandwidth: 126.50MHz: Above_____KHz Below_____KHz
118.00MHz: Above_____KHz Below_____KHz
135.97MHz: Above_____KHz Below_____KHz

60dB Bandwidth: AGC Reference Voltage_____VDC
126.50MHz: Above_____KHz Below_____KHz
118.00MHz: Above_____KHz Below_____KHz
135.97MHz: Above_____KHz Below_____KHz

Adjacent 50KHz Channel: 126.55MHz_____dB 126.45MHz_____dB

(5) Manual Gain Control: _____mw max. _____watts min.

(6) Headphone Audio:_____mw

(7) Squelch: (a) Carrier/Noise Squelch set for_____uv
(b) Carrier Squelch set for_____uv
(c) Squelch Test_____(OK)

(8) Auxiliary Audio: #1_____watts min.
#2_____watts min.
#3_____watts min.

(9) Intercom:_____watts min.

b. Transmitter:

(1) Power Out:

118.00MHz_____watts 126.50MHz_____watts 135.975MHz_____watts

Low Voltage:

118.00MHz_____watts 126.50MHz_____watts 135.975MHz_____watts

(2) Modulation: Capabilities

(a) Microphone: Input_____VRMS

(b) 118.00MHz_____% 126.50MHz_____%

135.975MHz _____%

(c) Sidetone: _____mw min. _____mw max.

_____mw final adjust

Hardware _____OK Tested by _____

Paperwork _____OK Inspected by _____

Glyptol _____OK

Test Stamp _____OK

(3) Transmitter Frequency Stability:

118.00 _____MHz

123.100 _____MHz

126.50 _____MHz

130.575 _____MHz

135.975 _____MHz

KY 92 TEMPERATURE SPECIFICATIONS

Temperature requirements - 30 minutes stabilization period at +55°C and -20°C. At -20°C the unit shall be allowed to run for 15 minutes before data is taken.

c. Test Data at +55°C and -20°C

(1) Transmitter Power Out (5 watts min)

(a) 118.0MHz -20°C_____watts +55°C_____watts

(b) 126.5MHz -20°C_____watts +55°C_____watts

(c) 135.97MHz -20°C_____watts +55°C_____watts

(2) Crystal Frequency 003% .

(a) 127.0MHz 126.99619 127.00381 -20°C_____ +55°C_____

(b) 118.0MHz 117.99646 118.00354 -20°C_____ +55°C_____

(3) Modulation (85%) min

(a) 126.5MHz -20°C_____% +55°C_____%

(4) Comm Sensitivity (6dB min)

(a) 118.00MHz -20°C_____dB +55°C_____dB

(b) 126.50MHz -20°C_____dB +55°C_____dB

(c) 135.97MHz -20°C_____dB +55°C_____dB

(5) Comm SMO Lockup

(a) All MHz and KHz -20°C_____(OK) +55°C_____(OK)

(6) Squelch min. 1uv, max. 5uv

(a) 126.50MHz -20°C_____uv +55°C_____uv

6.3 OVERHAUL

6.3.1 VISUAL INSPECTION

This section contains instructions to assist in determining, by inspection, the condition of the KY 92 assemblies. Defects resulting from wear, physical damage, deterioration, or other causes can be found by these inspection procedures. To aid inpsection, detailed procedures are arranged in alphabetical order.

A. Capacitors, Fixed

Inspect capacitors for case damage, body damage, and cracked, broken or charred insulation. Check for loose, broken or improperly soldered connections.

B. Capacitors, Variable

Inspect trimmers for chipped and cracked bodies, damaged dielectrics and damaged contacts.

C. Chassis

Inspect the chassis for deformation, dents, punctures, badly worn surfaces, damaged connectors, damaged fastener devices, loose or missing hardware, component corrosion, and damage to finish.

D. Connectors

Inspect connector for broken parts, deformed shells or clamps, and other irregularities. Inspect for cracked or broken insulation and for contacts that are broken, deformed, or out of alignment. Also, check for corroded or damaged plating on contacts and for loose, improperly soldered, broken or corroded terminal connections.

E. Covers and Shields

Inspect covers and shields for punctures, deep dents, and badly worn surfaces. Also, check for damaged fastener devices, corrosion, and damage to finish.

F. Fuse and Clips

Inspect for blown fuse and check clips for loose or corroded connection.

G. Insulators

Inspect all insulators for evidence of damage, such as broken or chipped edges, burned areas, and presence of foreign matter.

H. Jacks

Inspect all jacks for corrosion, rust, deformations, loose or broken parts, cracked insulation, bad contacts, or other irregularities.

I. Potentiometers

Inspect all potentiometers for evidence of damaged or loose terminals, cracked insulation or other irregularities.

J. Relay

Inspect enclosure for physical damage and contacts for improper alignment, damaged plating or corrosion.

K. Resistors, Fixed

Inspect the fixed resistors for cracked, broken, blistered, or charred bodies and loose, broken, or improperly soldered connections.

L. RF Coils

Inspect all RF coils for broken leads, loose mountings, and loose improperly soldered, or broken terminal connections. Check for crushed, scratched, cut or charred windings. Inspect the windings, leads, terminals, and connections for corrosion or physical damage. Check for physical damage to forms and tuning slug adjustment screws.

M. Terminal Connections Soldered

1. Inspect for cold-soldered or resin joints. These joints present a porous or dull, rough appearance. Check for strength of bond using the points of a tool.

2. Examine the terminals for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other components.

3. Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at the terminal. Check for insulation that is stripped back too far from the terminal.

4. Inspect for corrosion at the terminal.

N. Transformers

1. Inspect for signs of excessive heating, physical damage to case, cracked or broken insulation, and other abnormal conditions.

2. Inspect for corroded, poorly soldered, or loose connecting leads or terminals.

O. Wiring/Coaxial Cable

Inspect open and laced wiring of chassis, subassembly chassis, and parts of equipment for breaks in insulation, conductor breaks, cut or broken lacing and improper dress in relation to adjacent wiring or chassis.

6.3.2 CLEANING

A. Using a clean, lint-free cloth lightly moistened with a mild cleaning detergent, remove all foreign matter from the equipment case and unit front panels. Wipe dry using a clean, lint-free cloth.

B. Using a hand controlled dry air jet (not more than 15psi), blow the dust from inaccessible areas. Care should be taken to prevent damage by the air blast.

C. Clean the receptacle and plugs with a hand controlled dry air jet (not more than 25psi) and a clean lint-free cloth lightly moistened with an approved mild cleaning solvent. Wipe dry with a clean, dry, lint-free cloth.

6.3.3 REPAIR

This section describes the procedure, along with any special techniques for replacing damaged or defective components.

A. Connectors

When replacing a connector, refer to the appropriate PC board assembly drawing and follow notes to insure correct mounting and mating of each connector.

B. Crystal

The use of other than a King crystal is considered an unauthorized modification.

C. Diodes

Diodes used are silicon and germanium; use long nose pliers as a heat sink under normal soldering conditions. Note the diode polarity before removal.

D. Feedthru Capacitors

The feedthru capacitors mounted on the printed circuit board should be removed carefully to avoid damage to the board. Avoid excessive heat. When replacing a feedthru capacitor, removal of nearby components may be necessary to protect them from the heat. Never apply heat directly to a feedthru capacitor; instead heat the mounting surface around it.

E. Integrated Circuits

Refer to APPENDIX "A" for removal and replacement instructions.

F. Wiring/Coaxial Cable

When repairing a wire that has broken from its terminal, remove all old solder and pieces of wire from the terminal, restrip the wire to the necessary length and resolder the wire to the terminal. Replace a damaged wire or coax with one of the same type, size and length.

6.3.4 DISASSEMBLY/ASSEMBLY PROCEDURES (See Figure 5-1, Section V, Unit Final Assembly 300-2311-00)

6.3.4.1 Disassembly of the KY 92 for Alignment

a. Disconnect power.

b. Remove bottom cover by removing 12 screws.

6.3.4.2 Disassembly of the KY 92 for Service and Inspection

a. Perform steps a and b of paragraph 6.3.4.1.

b. Remove top cover by removing 12 screws.

c. Snap off top and bottom SMO covers by gently prying at edges.

d. Remove 3 screws from the preselector cover and lift off.

e. Loosen two (2) set screws from the squelch switch coupler with a #.060 Bristol wrench.

f. Set the frequency dials to 130.00MHz and remove 4 screws from the sides of the front panel. Gently pull the front panel from the radio.

g. Remove the transmitter by removing 7 screws and gently pulling straight out. The service loop will allow the casting to be pulled clear of the standoffs.

h. The digital subassembly may be removed by unsoldering six (6) wires and removing five (5) screws. This subassembly only needs to be removed to replace the squelch switch or the ON-OFF/VOLUME control assemblies.

i. The digital PC board may be loosened to allow inspection or removal of the frequency selector switch assembly. First, unsolder and remove the two (2) pilot lamps. Unsolder four (4) wires (brown, red, orange and yellow) going to switchboard. Remove five (5) screws holding switch board at the front, two (2) screws holding the digital PC board and the screws holding the regulator. Tilt the digital PC board and the switch board out of the shield enclosure inspection or replacing of the switchboard.

6.3.4.3 ASSEMBLY PROCEDURE

The assembly procedure for the KY 92 is basically the reverse of the disassembly procedure. Be careful not to pinch any leads under metal parts when reassembling.

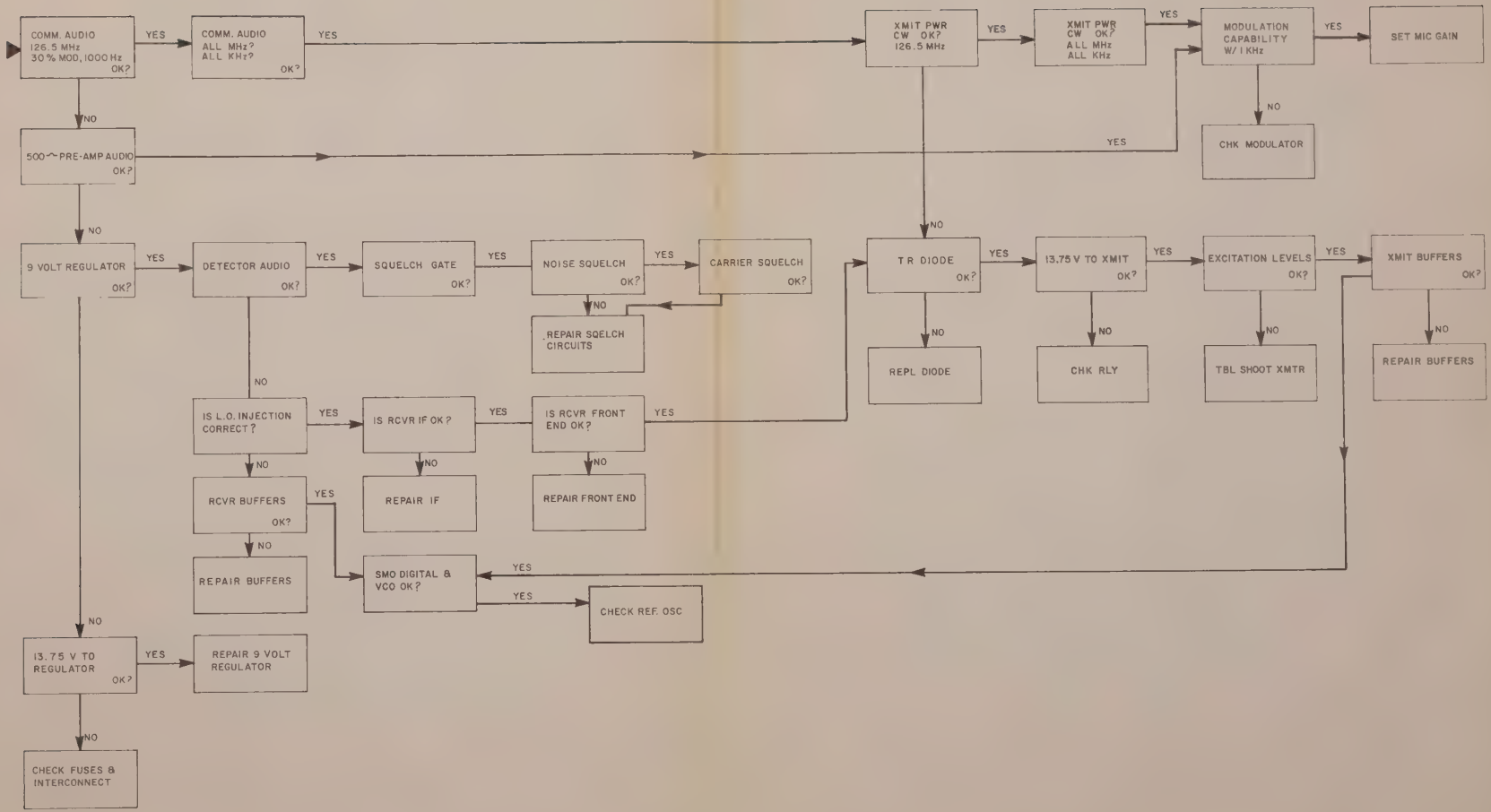


FIGURE 6-6 KY 92 TROUBLESHOOTING FLOW CHART
(Dwg. No. 696-2956-00, R-0)

6.4 TROUBLESHOOTING THE KY 92

This section is intended for use as a guide in isolating malfunctions in a KY 92. The guidance presented here and the figures referenced by no means cover all causes of failure but are intended as a guide to locate the specific area of failure.

The troubleshooting flow chart, Figure 6-6, will help in locating sources of failure.

After troubleshooting procedures have been completed and the cause of the malfunction repaired, the unit should be checked and aligned using the procedures of 6.2.3.

6.4.1 TROUBLESHOOTING PROCEDURE

A. Voltage Regulator

1. Verify 13.75 volts at each end of F101A.
2. Verify 9.0 volts at TP1.
3. Verify 5.0 volts at pin 1 of U301 (resistor module).

B. Local Oscillator

1. Verify that L.O. level is more than 1.5V p-p with oscilloscope.
2. Verify that L.O. is 11.4MHz above desired frequency with counter. (If off frequency see J).

C. Audio

1. With 100uv, 30% modulated at 1KHz in the audio output should be 5 watts minimum with the volume control clockwise.
2. 6.4VRMS should appear at the jumper between pin 10 and pin H of J921.

D. VCO Voltage

1. With frequency dial at 126.50MHz, voltage at TP 4 should be near 6.35V.
2. The voltage at the cathodes of CR101, CR102, and CR103 should be near 6.35V.

E. AGC Amplifier

1. The voltage at TP2 is typically 5.6V with 100uv signal.
2. The voltage at TP3 is typically 4.8V with 100uv signal.
3. The voltage at TP3 is typically 7.6V with no RF input.

F. Detector

1. Verify approximately .8V p-p at pin 11, I102 with 100uv, 30% modulation at 1KHz.

G. Squelch Gate

1. Verify approximately .8V p-p at pin 7, I102 with 100uv, 30% modulation at 1KHz.

H. Compressor

1. Verify approximately ,8V p-p at pin 7, I104 with 100uv, 30% modulation at 1KHz.

I. Transmitter(connect to 50 ohm load)

1. Check for relay operation.
2. Verify +18dBm (typical) from transmitter buffer (E108).
3. Verify correct frequency at buffer output.
4. Verify E103 at +5V.
5. Verify E421 at 13.75V.
6. Verify E418 at 13.75V.

J. Synthesizer Frequency

1. Verify phase lock at approximately 5 volts (E302).
2. Verify correct switch code (see Section IV).
3. Verify reference frequency (25KHz square wave) at pin 14 of I313.
4. Verify variable frequency (25KHz square wave) at pin 3 of I313.

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SEMICONDUCTOR AND INTEGRATED CIRCUIT DATA

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1.1 GENERAL

Due to wide utilization of semiconductors in this electronic equipment, somewhat different techniques are necessary in maintenance procedures. In solid state circuits the impedances and resistances encountered are of much lower values than those encountered in vacuum-tube circuits. Therefore, a few ohms discrepancy can greatly affect the performance of the equipment. Also, coupling and filter capacitors are of larger values and usually are of the tantalum type. Hence, when measuring values of capacitors, an instrument accurate in the high ranges must be employed. Capacitor polarity must be observed when measuring resistance. Usually more accurate measurements can be obtained if the semiconductors are removed or disconnected from the circuits.

1.1.1 SEMICONDUCTOR TEST EQUIPMENT

Damage to semiconductors by test equipment is usually the result of accidentally applying too much voltage to the elements. Common causes of damage from test equipment are discussed in the following paragraph.

A. Transformerless Power Supplies

Test equipment with transformerless power supplies is one source of high current. However, this type of test equipment can be used by employing an isolation transformer in the AC power line.

B. Line Filter

It is still possible to damage semiconductors from line current, even though the test equipment has a power transformer in the power supply, if the test equipment is provided with a line filter. This filter may function as a voltage divider and apply half voltage to the semiconductor. To eliminate this condition, connect a ground wire from the chassis to the test equipment to the chassis of the equipment under test before making any other connections.

C. Low-Sensitivity Multimeters

Another cause of semiconductor damage is a multimeter that requires excessive current to provide adequate indications. Multimeters with sensitivities of less than 20,000 ohms-per-volt should not be used on semiconductors. When in doubt as to the amount of current supplied by a multimeter, check the multimeter circuits on all scales with an external, low-resistance multimeter connected in series with the multimeter leads. If more than one milliampere is drawn on any range, this range cannot be safely used on small semiconductors.

D. Power Supply

When using a battery-type power supply, always use fresh batteries of the proper value. Make certain that the polarity of the power supply is correct for the equipment under test. Do not use power supplies having poor voltage regulation.

1.1.2 SEMICONDUCTOR VOLTAGE AND RESISTANCE MEASUREMENTS

When measuring voltage or resistance in circuits containing semiconductor devices, remember that these components are polarity and voltage conscious. Since the values of capacitors used in semiconductor circuits are usually large, time is required to charge these capacitors when they appear. Thus, any reading obtained is subject to error if sufficient time is not allowed for the capacitor to fully charge. When in doubt it may be best in some cases to isolate the components in question and measure them individually.

1.1.3 TESTING OF TRANSISTORS

A transistor checker should be used to properly evaluate transistors. If a transistor tester is not available, a good multimeter may be used. Make sure that the multimeter meets the requirements outlined in the preceding paragraph.

A. PNP Transistor

To check a PNP transistor, connect the positive lead of the multimeter to the base of the transistor and the negative lead to the emitter or collector. Generally, a resistance reading of 50,000 ohms or more should be obtained. Reconnect the multimeter with the negative lead to the base. With the positive lead connected to the emitter or collector a resistance value of 500 ohms or less should be obtained.

B. NPN Transistor

Similar tests made on an NPN transistor should produce the following results:

With the negative lead of the multimeter connected to the base of the transistor the value of resistance between the base and the collector or emitter should be high. With the positive lead of the multimeter connected to the base, the value of resistance between the base and the collector or emitter should be low. If these results are not obtained, the transistor is probably defective and should be replaced.

CAUTION

IF A TRANSISTOR IS FOUND TO BE DEFECTIVE, MAKE CERTAIN THAT THE CIRCUIT IS IN GOOD OPERATING ORDER BEFORE INSTALLING A REPLACEMENT TRANSISTOR. IF A SHORT CIRCUIT EXISTS IN THE CIRCUIT, PUTTING IN ANOTHER TRANSISTOR WILL MOST LIKELY RESULT IN BURNING OUT THE NEW COMPONENT. DO NOT DEPEND UPON FUSES TO PROTECT TRANSISTORS.

Always check the value of the bias resistors in series with the various elements. A transistor is very sensitive to improper bias voltage; therefore, a short or open circuit in the bias resistors may damage the transistor.

1.1.4 REPLACING SEMICONDUCTORS

Never remove or replace a semiconductor with the supply voltage turned on. Transients thus produced may damage the semiconductor or others remaining in the circuit. If a semiconductor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the semiconductor than normally is used in the circuit from which it came.

A. Use only a low heat soldering iron when installing or removing soldered-in semiconductors. Grasp the lead to which heat is applied between the solder joint and the semiconductor with long nosed pliers.

This will dissipate some of the heat that would otherwise be conducted into the semiconductor from the soldering iron. Make certain that all wires soldered to semiconductor terminals have first been properly tinned so that the necessary connection can be made quickly. Excessive heat will permanently damage a semiconductor.

B. In some cases, power transistors are mounted on heat-sinks that are designed to dissipate heat away from them. In some power circuits, the transistor must also be insulated from ground. This insulating is accomplished by means of an insulating washer made of mica. When replacing transistors mounted in this manner, be sure that the insulating washers are replaced in proper order. After the transistor is mounted, and before making any connections, check from the case of the transistor to ground with a multimeter to see that the insulation is effective.

1.2 INTEGRATED CIRCUIT MAINTENANCE

1.2.1 GENERAL

A knowledge of integrated circuit fundamentals is as necessary in testing digital logic circuits involving IC's as a knowledge of rectification fundamentals is needed to test a power supply.

1.2.2 TERMINOLOGY

Several terms are used whenever logic circuits are discussed:

A. A logic state is defined as a high or low level voltage applied to the input or seen at the output of a device. A high level voltage is called a logic "1". A low level voltage is called a logic "0". Logic threshold voltage of a device is the input voltage required at an input to change the output state.

B. A truth table is a list of input logic states that will yield certain output logic states. A digital logic element should be thought of as a circuit element with its output level being either HI or LO as programmed by the levels present on its inputs.

A logic element may be tested by verifying that it is performing per the truth table of that logic element.

C. Logic elements which have multiple inputs and a single output are known as gates. The OR gate produces a HI output when one or more of the inputs are HI. With all inputs LO, the output is LO. The AND gate produces a HI output only when all inputs are HI. When any input is LO the output is LO. A small circle at the output of a gate on the schematics indicates "negation", which means that the sense of the gate logic is reversed. An OR gate with negation is called a NOR gate and an AND gate with negation is called a NAND gate. A NOR gate produces a LO output when one or more of the inputs are HI and a NAND gate produces a LO output only when all inputs are HI.

D. The flip-flop logic element is the basic data storage element of digital logic. It has two outputs that are always at opposite logic levels. That is, when one output is HI the other is LO. The flip-flop will remain in a particular state until that state is changed by an input signal.

The operation of these flip-flops is controlled by the signals on their inputs, and it best understood by a careful study of their truth tables. It should be kept in mind that a small circle on either the input or the output indicates negation. Also, a circle on a clock input indicates that a HI to LO transition causes the flip-flop to function.

E. Besides the gates and flip-flops, two other commonly used logic elements are inverters and expanders. Inverters are merely switching transistors such that if a logic "1" is the input to a device, a logic "0" will be the output and vice-versa. An expander is a set of parallel switching transistors that depends upon another resistor to provide their supply voltage. Generally, these devices are used to expand the number of inputs available to a standard gate.

1.2.3 INTEGRATED CIRCUIT TEST EQUIPMENT

As with semiconductors, damage to integrated circuits be test equipment is usually the result of applying too much current or voltage to the elements. The same precautions as discussed in paragraph 1.1.1 apply here.

1.2.4 VOLTAGE MEASUREMENTS

Precise voltage measurements are not needed in testing digital IC's other than to see that the voltage is a HI or a LO level. An oscilloscope is needed where the input levels are of short duration, either HI or LO. For instance, if a 10 microsecond pulse going from LO to HI was applied to one input of a NOR gate, while the other input stayed LO, the output would go LO for 10 microseconds and then return HI. This, of course, could not be seen without an oscilloscope.

1.2.5 TESTING INTEGRATED CIRCUITS

The fully loaded guaranteed minimum high and maximum low for the digital logic output levels are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.25V)	
High	Low	High	Low
2.4	0.5	4.25	3.48

The minimum high and maximum low input levels which are guaranteed to be correctly interpreted are:

TTL (V_{CC} = +5V)		ECL (V_{CC} = +5.2V)	
High	Low	High	Low
2.0	0.8	4.06	3.75

When checking input and output levels of a logic element under question it should be remembered that an input or output may not agree with its truth table not because it has malfunctioned but because some other component connected to the same point has shorted to ground or to the supply voltage (V_{CC}). This is not common when an output on one element is connected to an input of another. A majority of digital IC failures can be grouped into three categories:

A. Input(s) or output shorted to ground pin of IC.

B. Input(s) or output shorted to V_{CC} pin of IC.

C. Open input(s) or output.

An input or output shorted to ground would be a constant LO and an input or output shorted to V_{CC} would be a constant HI.

Other failures common in digital IC's are:

A. Ground pin open.

B. V_{CC} pin open.

C. Inputs shorted together.

An open ground pin would not allow a LO on the output. An open V_{CC} pin would not allow a HI on the output. (Remember to isolate the device from other components connected to it). Two or more inputs shorted together can be checked by grounding one of the inputs under question. If the other input also goes to ground they are probably shorted.

CAUTION

IF AN IC IS FOUND TO BE DEFECTIVE, VERIFY THAT PROPER POWER SUPPLY VOLTAGES ARE PRESENT BEFORE INSTALLING A REPLACEMENT IC.

1.2.6 REPLACING INTEGRATED CIRCUITS

If an IC is known to be defective, the easiest way to remove it is to cut off each of its pins, remove the case, and then unsolder the remaining pins from the integrated circuit card one by one. This is preferrable over removing the IC intact because attempts to remove the IC intact may result in damage to the printed circuit board.

FIGURE 1. BUFFER

$Z = A$

A	Z
0	0
1	1

FIGURE 2. INVERTER

$Z = \overline{A}$

A	Z
0	1
1	0

FIGURE 3. NOR GATE

$Z = \overline{A+B+C}$

A	B	C	Z
0	0	0	1
1	0	0	0
0	1	0	0
0	0	1	0
1	1	0	0
1	0	1	0
0	1	1	0
1	1	1	0

FIGURE 4. NAND GATE

$Z = \overline{A\,B\,C}$

A	B	C	Z
0	0	0	1
1	0	0	1
0	1	0	1
0	0	1	1
1	1	0	1
1	0	1	1
0	1	1	1
1	1	1	0

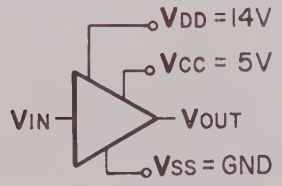
FIGURE 5. EXCLUSIVE OR GATE

$Z = A \oplus B$

A	B	Z
0	0	0
1	0	1
0	1	1
1	1	0

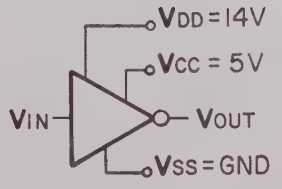
FIGURE 6. TTL TO CMOS VOLTAGE LEVEL TRANSLATORS

BUFFER



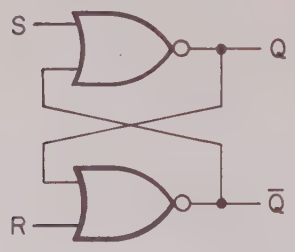
V_{IN}	0V	14V
V_{OUT}	0V	5V

INVERTER



V_{IN}	0V	14V
V_{OUT}	5V	0V

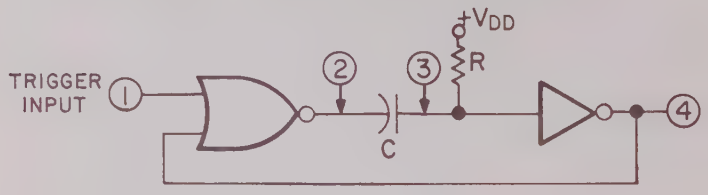
FIGURE 7. NOR GATE FLIP-FLOP



S	R	Next Q	$\overline{Q}$
1	1	0	0
0	1	1	0
0	0	NC	NC
1	0	0	1

NC = NO CHANGE

FIGURE 8. MONOSTABLE MULTIVIBRATOR (ONE-SHOT)



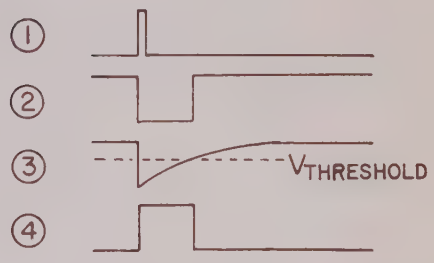
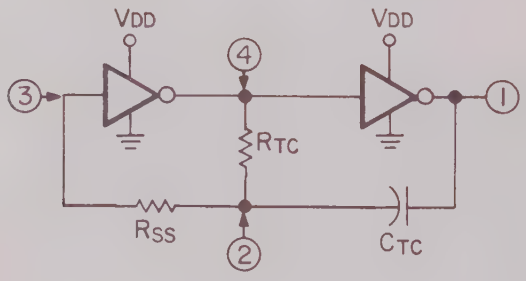
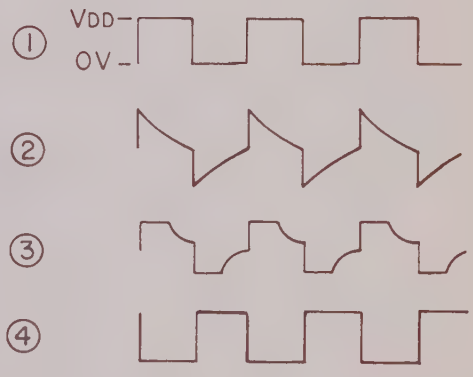


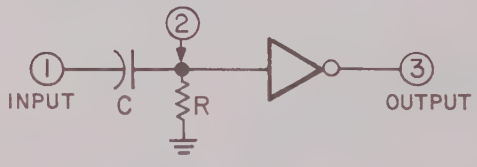
FIGURE 9. ASTABLE MULTIVIBRATOR (FREE-RUNNING)

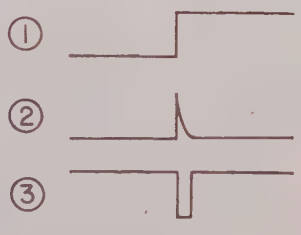




FREQUENCY OF OPERATION IS DETERMINED BY R_{TC} AND C_{TC}.
A NOR OR NAND GATE MAY BE USED IN PLACE OF THE FIRST INVERTER TO PERMIT GATING OF THE MULTIVIBRATOR.

FIGURE 10. DIFFERENTIATOR



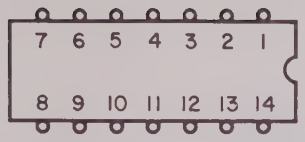


OFTEN USED TO CHANGE A STEP SIGNAL TO A SHORT PULSE SIGNAL.

INTEGRATED CIRCUIT PIN LOCATION DIAGRAMS

(Viewed From TOP of IC)

1



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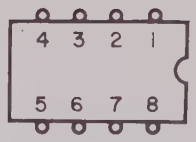
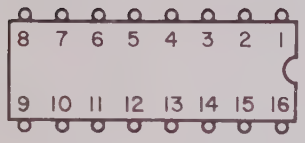


2



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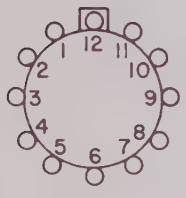
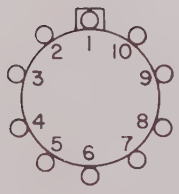


4

5



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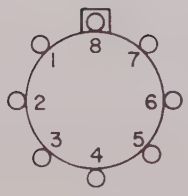


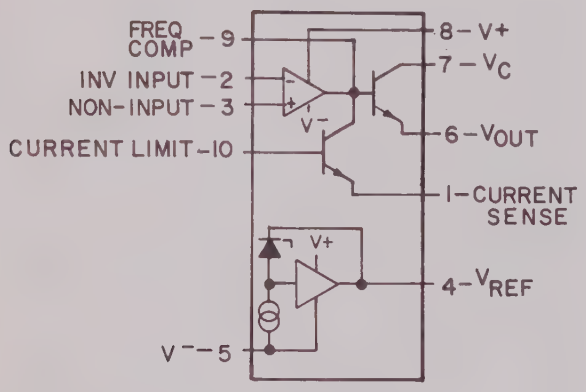
NOTE

The LSI's (I202, I216, I301, and I302) are not included in the appendix because they are too complex to be covered adequately by a brief description. The individual pins of the LSI's are labeled on the schematics. A functional description of what they do may be found in the detailed theory of operation.

LM723CN MONOLITHIC VOLTAGE REGULATOR

GENERAL DESCRIPTION

The uA723 is a monolithic voltage regulator: The device consists of a temperature compensated reference amplifier, error amplifier, power series pass transistor and current limit circuitry. Additional NPN or PNP pass elements may be used when output currents exceeding 150ma are required. Provisions are made for adjustable current limiting and remote shutdown. In addition to the above, the device features low standby current drain, low temperature drift and high ripple rejection. The uA723 is intended for use with positive or negative supplies as a series, shunt, switching or floating regulator. Applications include laboratory power supplies, isolation regulators for low level data amplifiers, logic card regulators, small instrument power supplies, airborne systems and other power supplies for digital and linear circuits.

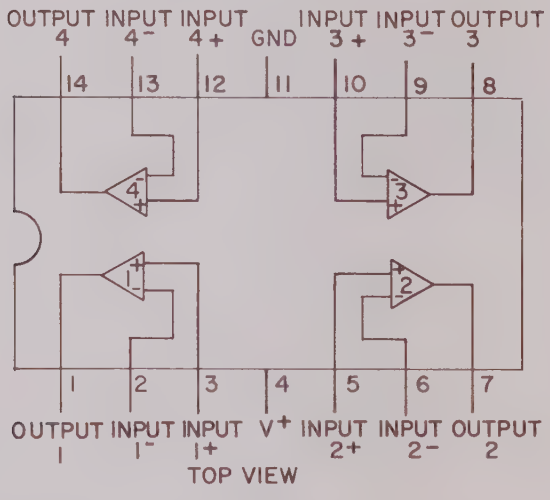


REF: Pin location diagram #4

LM324N QUAD OP AMPS

The LM124 series consists of four independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

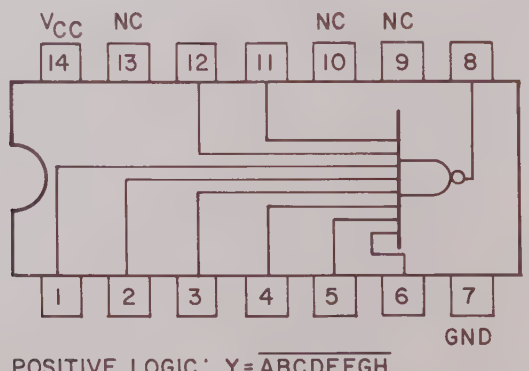
DUAL-IN-LINE AND FLAT PACKAGE



TOP VIEW

74LS30 8-INPUT NAND GATE

DIP (TOP VIEW)



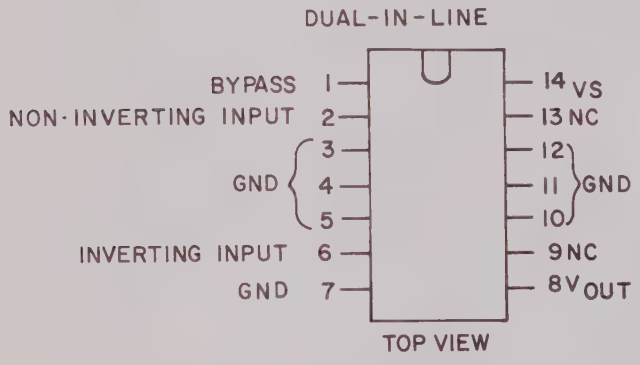
POSITIVE LOGIC: $Y = \overline{ABCDEFGH}$

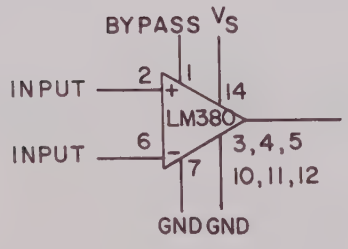
NC – NO INTERNAL CONNECTION

LM380N AUDIO POWER AMPLIFIER

The LM380 is a power audio amplifier for consumer application. In order to hold system cost to a minimum, gain is internally fixed at 34dB. A unique input stage allows inputs to be ground referenced. The output is automatically self entering to one half the supply voltage.

The output is short circuit proof with internal-thermal limiting. The package outline is standard dual-in-line. A copper lead frame is used with the center three pins on either side comprising a heat sink. This makes the device easy to use in standard p-c layout. A mini dual-in-line package version with reduced power capability is also available.



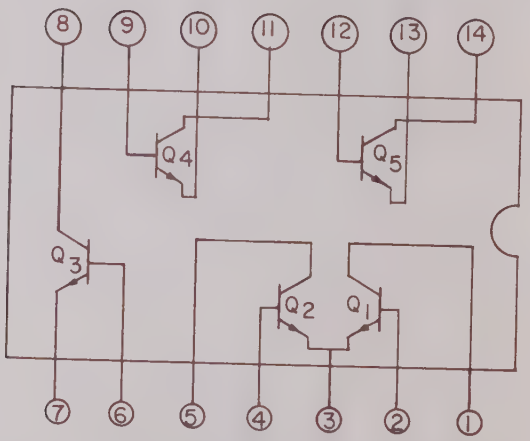


CA3086 INTEGRATED CIRCUIT

TRANSISTOR ARRAY

RCA-CA3086 consists of five general-purpose silicon n-p-n transistors on a common monolithic substrate. Two of the transistors are internally connected to form a differentially-connected pair.

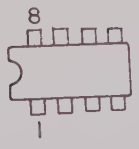
The transistors of the CA3086 are well suited to a wide variety of applications in low-power systems at frequencies from DC to 120MHz. They may be used as discrete transistors in conventional circuits. However, they also provide the very significant inherent advantages unique to integrated circuits, such as compactness, ease of physical handling and thermal matching.



FUNCTIONAL DIAGRAM OF THE CA3086

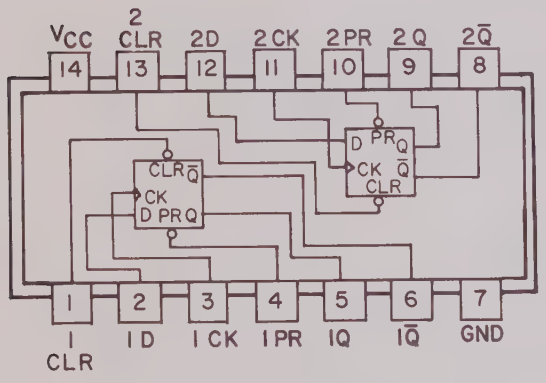
MC1350 VIDEO IF AMPLIFIER

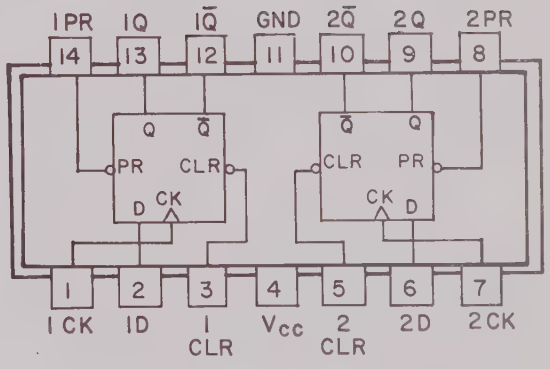
...an integrated circuit featuring wide range AGC for use as an IF amplifier in radio and TV over the temperature range 0 to +75°C. The MC1352 is similar in design but has a keyed-AGC amplifier as an integral part of the same chip.



74LS74

DUAL D-TYPE POSITIVE-EDGE-TRIGGERED FLIP-FLOPS WITH PRESET AND CLEAR





FUNCTION TABLE

INPUTS				OUTPUTS	
PRESET	CLEAR	CLOCK	D	Q	$\bar{Q}$
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H*	H*
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q_0	$\bar{Q}_0$

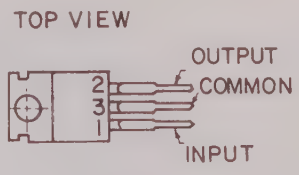
*THIS CONFIGURATION IS NONSTABLE; THAT IS, IT WILL NOT PERSIST WHEN PRESET AND CLEAR INPUTS RETURN TO THEIR INACTIVE (HIGH) LEVEL.

MGH7805 3-TERMINAL POSITIVE VOLTAGE REGULATORS

GENERAL DESCRIPTION

The uA7805 is a monolithic 3-terminal positive voltage regulator constructed using the Fairchild Planar* epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1 A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltage and currents.

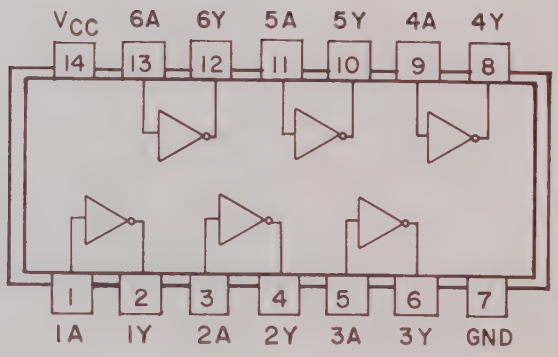
*Planar is a patented Fairchild process.



SN7416 HEX INVERTER BUFFERS/DRIVERS WITH OPEN-COLLECTOR HIGH-VOLTAGE OUTPUTS

positive logic:

$Y = \overline{A}$



SCL4060

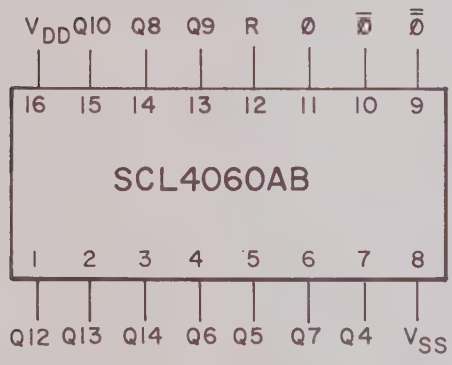
CMOS 14-STAGE BINARY COUNTER AND OSCILLATOR

DESCRIPTION

The SCL4060AB consists of an oscillator section and 14 ripple-carry binary counter stages. The oscillator configuration allows design of either R-C or crystal oscillator circuits. A Reset input is provided which resets the counter to the all-0's stage. A high level on the Reset line accomplishes the reset function. The state of the counter is advanced one step in binary order on the negative transition of the clock input Ø. All inputs and outputs are fully buffered. Outputs are available from stages 4 through 10 and 12 through 14.

Applications include timers, frequency dividers, delay circuits and counter controls.

CONNECTION DIAGRAM



TRUTH TABLE

CLOCK	RESET	OUTPUT STATE
⌐‾	0	NO CHANGE
‾⌐	0	ADVANCE TO NEXT STATE
X	1	ALL OUTPUTS ARE LOW

X = DON'T CARE

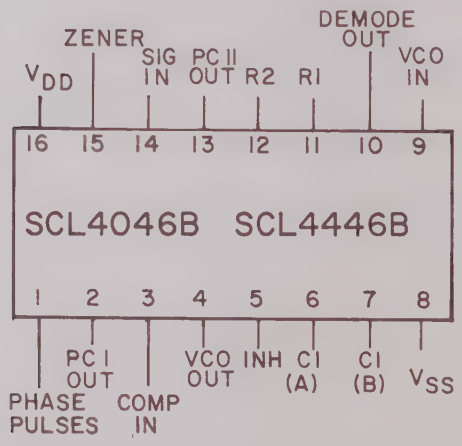
ADD SUFFIX FOR PACKAGE:

- C 16-PIN CERDIP
- D 16-PIN CERAMIC
- E 16-PIN EPOXY
- F 16-PIN FLAT
- H CHIP

SCL4046B CMOS PHASE-LOCKED LOOPS

DESCRIPTION

The SCL4046B and SCL4446B phase-locked loops contain two phase comparators, a voltage-controlled oscillator (VCO), source follower, and zener diode. The comparators have two common inputs. The signal input can be used directly coupled to large voltage signals, or indirectly coupled (with a series capacitor) to small voltage signals. The self-bias circuit adjusts small voltage signals in the linear region of the ampliifer. Phase comparator I (an exclusive-OR gate) provides a digital error signal PCI_{out}, and maintains 90^{o} phase shift at the center frequency between signal and compartor inputs (both at 50% duty cycle). Phase comparator II (with leading edge sensing logic) provides digital error signals $PCII_{out}$ and phase pulses, and maintains a 0^{o} phase shift between input signals (duty cycle is immaterial). The linear VCO produces an output signal VCO_{out} whose frequency is determined by the voltage of input VCO_{in} and the capacitor and resistors connected to pins $C1_{A}$, $C1_{B}$, R1, and R2. The source follower output, Demod Out, with an external resistor is used where the VCO_{in} signal is needed but no loading can be tolerated. The inhibit input Inh, when high, disables the VCO and source follower to minimize standby power consumption. The zener diode can be used to assist in power supply regulation.



ADD SUFFIX FOR PACKAGE:

- C 16-PIN CERDIP
- D 16-PIN CERAMIC
- E 16-PIN EPOXY
- F 16-PIN FLAT
- H CHIP

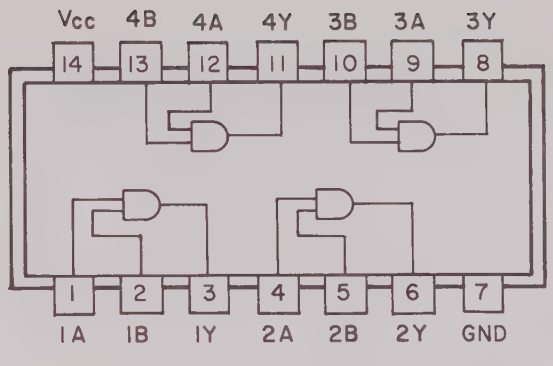
74LS09

QUADRUPLE 2-INPUT POSITIVE AND GATES

WITH OPEN-COLLECTOR OUTPUTS

positive logic:

$Y = AB$

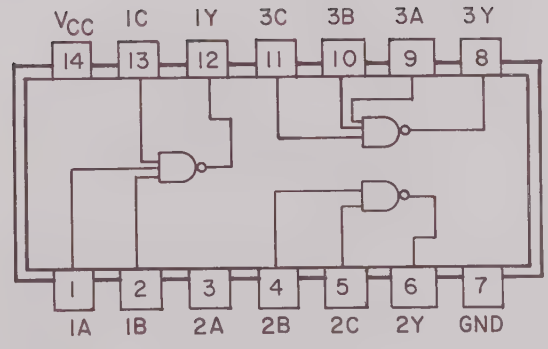


74LS10

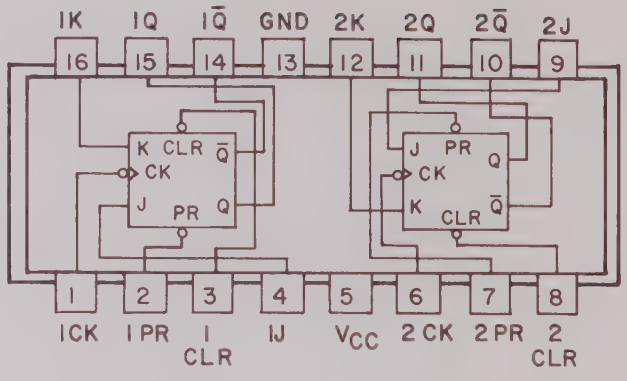
TRIPLE 3-INPUT POSITIVE NAND GATE

positive logic:

$Y = \overline{ABC}$



74LS76 DUAL J-K FLIP FLOPS WITH PRESET AND CLEAR



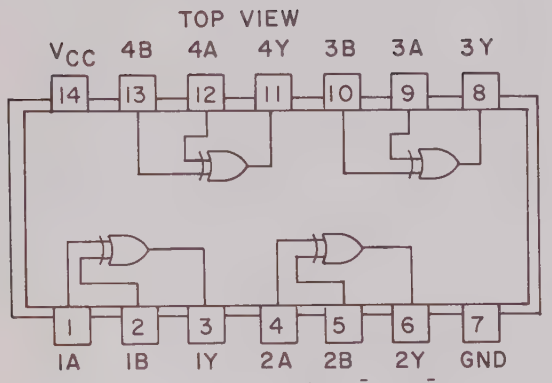
FUNCTION TABLE

INPUTS					OUTPUTS	
PRESET	CLEAR	CLOCK	J	K	Q	$\bar{Q}$
L	H	X	X	X	H	L
H	L	X	X	X	L	H
L	L	X	X	X	H*	H*
H	H	↓	L	L	Q_0	$\bar{Q}_0$
H	H	↓	H	L	H	L
H	H	↓	L	H	L	H
H	H	↓	H	H	TOGGLE	
H	H	H	X	X	Q_0	$\bar{Q}_0$

*THIS CONFIGURATION IS NONSTABLE : THAT IS, IT WILL NOT PERSIST WHEN PRESET AND CLEAR INPUTS RETURN TO THEIR INACTIVE (HIGH LEVEL).

74LS86 QUADRUPLE

2 INPUT EXCLUSIVE-OR GATES



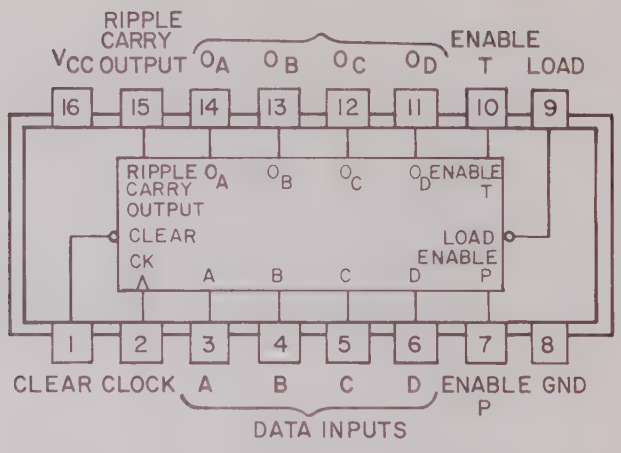
POSITIVE LOGIC $Y = A \oplus B = \bar{A}B + A\bar{B}$

FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

H = HIGH LEVEL, L = LOW LEVEL

74LS162 SYNCHRONOUS 4-BIT COUNTER



DESCRIPTION

These synchronous, presettable counters feature an internal carry look-ahead for application in high-speed counting designs. The '162 is a decade counter. Synchronous operation is provided by having all flip-flops clocked simultaneously so that the outputs change coincident with each other when so instructed by the count-enable inputs and internal gating. This mode of operation eliminates the output counting spikes that are normally associated with asynchronous (ripple clock) counters. A buffered clock input triggers the four flip-flops on the rising (positive-going) edge of the clock input waveform.

These counters are fully programmable; that is, the outputs may be preset to either level. As presetting is synchronous, setting up a low level at the load input disables the counter and causes the outputs to agree with the setup date after the next clock pulse regardless of the levels of the enable inputs. Low-to-high transitions at the load input should be avoided when the clock is low if the enable inputs are high at or before the transistion. The clear function is synchronous and a low level at the clear input sets all four of the flip-flop outputs low after the next clock pulse, regardless of the levels of the enable inputs. This synchronous clear allows the count length to be modified easily as decoding the maximum count desired can be accomplished with one external NAND gate. The gate output is connected to the clear input to synchronously clear the counter to 0000 (LLLL). Low-to-high transitions at the clear input of the '162 should be avoided when the clock is low if the enable and load inputs are high at or before the transition.

The carry look-ahead circuitry provides for cascading counters for n-bit synchronous applications without additional gating. Instrumental in accomplishing this function are two count-enable inputs and a ripple carry output. Both count-enable inputs (P and T) must be high to count, and input T is fed forward to enable the ripple carry output. The ripple carry output thus enabled will produce a high-level output pulse with a duration approximately equal to the high-level portion of the Q_A output. The high-level overflow ripple carry pulse can be used to enable successive cascaded stages. High-to-low-level transitions at the enable P or T inputs should occur only when the clock input is high.

93L24 MEDIUM SPEED EXPANDABLE COMPARATOR

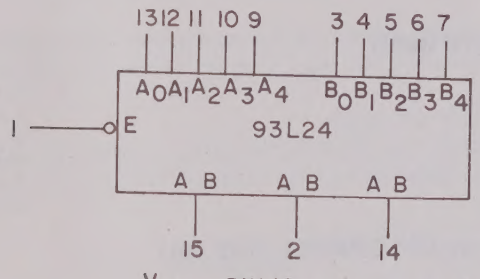
FUNCTIONAL DESCRIPTION

The 93L24 5-bit comparator uses combinational circuitry to directly generate "A greater than B" and "A less than B" outputs. As evident from the logic diagram, these outputs are generated in only three gate delays. The "A equals B" output is generated in one additional gate delay be decoding the "A neither less than nor greater than B" condition with a NOR gate. All three outputs are activated by the active LOW enable input ($\overline{E}$).

Tying the A B output from one device into an A input on another device and the A B output into the corresponding B input permits easy expansion as shown in Figure 1.

The A_4 and B_4 inputs are the most significant inputs and A_0, B_0 the least significant. Thus if A_4 is HIGH and B_4 is LOW, the A B output will be HIGH regardless of all other inputs except $\overline{E}$.

LOGIC SYMBOL



V_{CC} = PIN 16
GND = PIN 8

TRUTH TABLE

$\overline{E}$	A	B	A<B	A>B	A=B
H	X	X	L	L	L
L	WORD A = WORD B		L	L	H
L	WORD A > WORD B		L	H	L
L	WORD A < WORD B		H	L	L

L = LOW VOLTAGE LEVEL
H = HIGH VOLTAGE LEVEL
X = EITHER HIGH OR LOW VOLTAGE LEVEL

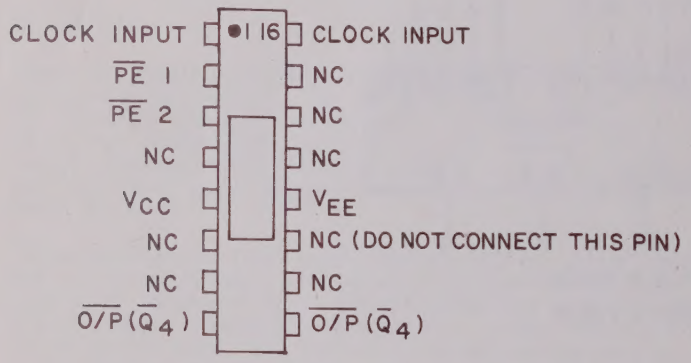
SP8640B HIGH SPEED DIVIDERS

In frequency synthesis it is desirable to start programmable division at as high a frequency as possible, because this raises the comparison frequency and so improves the overall synthesizer performance.

The SP8640 series are UHF integrated circuits that can be logically programmed to divide by either 10 or 11, with input frequencies up to 350MHz. The design of very fast programmable dividers is therefore greatly simplified by the use of these devices and makes them particularly useful in frequency synthesizers operating in the UHF band.

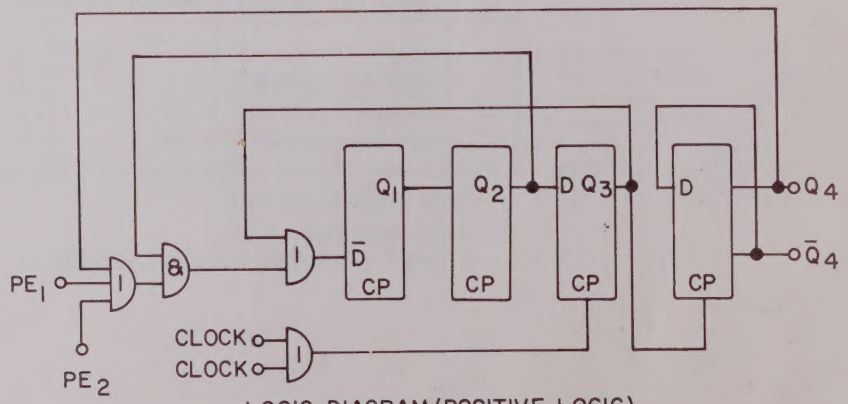
All inputs and outputs are ECL-compatible throughout the temperature range: the clock inputs and programming inputs are ECL III-compatible while the two complementary outputs are ECL II-compatible to reduce power consumption in the output stage. ECL III output compatibility can be achieved very simply, however.

The division ratio is controlled by two $\overline{PE}$ inputs. The counter will divide by 10 when either $\overline{PE}$ input is in the high state and by 11 when both inputs are in the low state. Both the $\overline{PE}$ inputs and the clock inputs have nominal 4.3K ohm pulldown resistors to V_{EE} (negative rail).



PIN CONNECTIONS

NOTE: Unused pins (except 8 and 9) may be connected to V_{EE}; this will reduce clock breakthrough on the outputs. Pins 8 and 9 should be left open-circuit when not in use. Pin 11 is internally connected and must always be left open-circuit.



LOGIC DIAGRAM (POSITIVE LOGIC)